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## APPLICATION OF RADIOLOGY AND PHYSIOTHERAPY TO GYNECOLOGY: A SYMPOSIUM

### Part IV—Galvanism\*

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MR. CHAIRMAN, Ladies and Gentlemen: As a member of a medical school which is over eight centuries old, situated in a town which is still older, I have the privilege of addressing you who are younger and more vigorous members on the subject of physiotherapy and who, I am sure, will do a great deal to advance it throughout the world.

I shall now proceed with my subject, galvanotherapy. The subject of galvanotherapy is interesting in this respect, that the change from electrotherapeutics from the realms of empiricism to the position it now occupies as a scientific branch of medicine was commenced with the study of galvanic current and the work done by Professor Leduc of Nantes.



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#### DEFINITION

If you connect your body to any constant source of electric potential, the ions present in the tissues of the body start to migrate. Those of positive charge migrate from the positive electrode to the negative, and vice versa. The migration of ions, with the positive going in one direction and the negative going in the other direction, is the galvanic current, and I want particularly to impress upon you to keep that picture in your mind, that *this migration of ions in the body is the electric current.*

That migration of ions through the tissues, which is the current, is accompanied by certain known chemical changes, certain physical changes, certain changes which we call physiochemical or ionic, and certain physiological changes, and it is the response of the tissues directly or indirectly

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to those changes which results in cure or alleviation of diseases.

I will give a few examples which will illustrate the points which I have laid down, by presenting the treatment of a few common maladies for which the galvanic current is, I consider, the treatment *par excellence*.

#### CHEMICAL ACTIVITY

When the ions reach the electrodes leading the current to and from the body, chemical changes take place. You can demonstrate these changes by putting two platinum wires upon a piece of moist litmus paper. You will see acids collect at the positive pole, and alkalies at the negative pole. These are the chemical changes. The chemical which collects mostly at the positive pole is hydrochloric acid; at the negative pole it is caustic soda. These chemicals have caustic action and can be used to destroy tissue. The advantages over the use of a chemical caustic are that in the electrical method you can make as much or as little of the caustic as you wish and you can take it where you wish.

Let me give you one example. Every Friday afternoon in my department at St. Bartholomew's Hospital I get a number of babies and young children to treat for nevi, and one form of nevus for which I consider galvanotherapy the best is the cavernous or venous nevus, producing a fluid swelling under the skin causing the skin to rise. If you place into that nevus a group of platinum needles—they are arranged in a spe-

cial holder, we use two, three, four or five mounted on the holder side by side, about a quarter of an inch apart and parallel—connected alternately to the positive and negative pole, you accomplish much good. These needles are plunged into the cavernous nevus and the current is passed through. The strength of the current, as a rough guide, is 20 milliamperes for each inch of imbedded positive needle. The current is increased, and the nevus ceases to be a fluid swelling and becomes solid. The chemicals which the current has developed, acid at the positive and alkali at the negative, coagulate the blood. The vessel walls which they transfix they destroy.

After the treatment, the nevus is a solid swelling. The blood is coagulated; it is in time replaced by fibrous tissue, and the nevus shrinks. If it is a small one, the size of the tip of the little finger, one application is sufficient. If it is larger (and I have had them as large as perhaps a hen's egg) more treatments are required. That is one use of galvanotherapy. You have gotten rid of the nevus, not because of electricity (you reserve that for the patient), but because your galvanic current has made for you certain caustics in the parts where you wanted them.

#### IONIC ACTIVITY

One other treatment is the treatment of a pedunculated wart by a zinc needle. Transfix the base of the wart at the level of the skin with a zinc needle. Complete the circuit by a plate electrode anywhere else on the body. Use a current one milliampere for one minute, the needle connected to the

positive pole. Zinc ions are formed at the base of the wart. Any infection which may be there as a positive cause of the wart is brought to an end, the vessel supplying the wart is destroyed, the wart gets pale in color, shrinks up, and in the course of a few days comes off.

1. *Metallic Ionization.* There is another application of galvanotherapy. When you place a copper or a zinc electrode in contact with a mucous membrane or with the base of an ulcer and connect that electrode to the positive pole, ions of the metal will migrate into the tissue, and will combine with the tissue proteins and form an insoluble albuminate. That form of treatment is especially valuable for chronic infected ulcers of the skin or the mucous membranes with or without ulceration.

The advantages of getting the caustic into the tissues by means of the galvanic current rest in the fact that it is the most thorough way of impregnating the infected tissue with medical agents. The limitations are to be considered, since it is impossible to get the ions to migrate more than a slight distance below the surface, say one or two millimeters. Let me give an illustration of this. Suppose you have a case of chronic infective endocervicitis. It is a very common malady in women and causes great distress and may last for years and years, a trouble which does not respond permanently to local applications of antiseptics. This can be overcome by means of the galvanic current. The galvanic current is your servant; if you use it correctly, you can eradicate chronic endocervicitis.

Place in the canal of the cervix a metal electrode, either copper or zinc, which fits the canal snugly. There is really no difference between the two metals. Connect it, first of all, to the negative pole, not the positive. Then in accordance to general electrical principles already enumerated the alkalis are developed in contact between the tissue and the metal, caustic soda being the caustic substance produced. At the same time, some of the caustic soda dissolves in the tissues and forms sodium ions and hydroxyl ions. The hydroxyl ion has a negative charge and is therefore made to migrate away from the negative electrode into the tissues. In that way you disinfect and destroy a certain amount of the infected mucous membrane, but there is something more important which happens. That is a prolonged increase in the secretion from the mucous glands which form the bulk of the tissues of the cervix. Usually there is also an exudation of watery fluid from the cervix, a form, perhaps, of lymph. After the application of a current of about 25 milliamperes for twenty minutes, there is a prolonged drainage of the cervical glands and the tissues of the cervix lasting for some hours or days afterwards. In other words, by galvanism you have procured a drainage of the tissues of the cervix.

Having given three applications at intervals of three days, put the electrode in position once more and connect it to the positive pole. Then ions will migrate into the tissues of the mucous membrane of the canal of the cervix. We are fond of using strong currents in my clinic at St. Bartholomew's. We use a current sometimes of 50, 70, 80 or

even 100 milliamperes. The ions which migrate in from the metal electrode combine with the tissues and form an albuminate. In other words, we have lined the canal of the cervix with a sterile membrane. The zinc or copper albuminates are antiseptic, sterile, no organisms can grow on them. It stays in the position for ten days or longer, during which time no further infection can take place from below, and any organisms left from behind, deep in the cervix are no doubt looked after by the natural protective methods of the body.

That, then, is an example of both a chemical action and a physiological action being produced by the galvanic current—the chemical action sterilizing the canal, the physiological action increasing the secretion from the glands.

2. *Vaporous Ionization.* There are other ions of value. One ion of great value is the chlorin ion, the ion which you introduce from a solution of sodium chloride under the negative pole. It is not the chlorin ion that does it, but we call it the chlorin ion. The value of the chlorin ion has been proved time and again during the late war in the softening of scar tissue. For a tough adherent scar apply the chlorin ionization to it and be patient (the process is slow) and you will always get a reward in the form of a soft scar. The method can be aided, also, by radiant heat before and massage afterwards, but the chlorin ionization is an essential part of the treatment.

#### PHYSICAL ACTIVITY

1. *Cataphoresis.* In other examples of galvanotherapy the migration of the ions,

which is the current, is accompanied by the physical effects. One of these effects is the passage of water from the anode, or positive pole, to the cathode, or negative pole. Let me explain why it is that the positive metal electrode in contact with the tissue becomes much drier and even adherent to the metal. The phenomenon is known as cataphoresis. May I digress here to say that the term cataphoresis should be restricted to the above mentioned phenomenon and should not be used to imply the use of the current causing migration of ions?

An example of this classification is in the treatment of a recent sprain or dislocation by the galvanic current. The treatment of sprains and dislocations by the galvanic current was practiced largely by a German called Remak in Berlin in about the seventies of the last century who described a great number of cases which were successfully treated. By its application the fluid was absorbed. I would recommend its application in the case of a recent sprain or discoloration, for the physical change accompanying the condition is doubtless due in some way or another to the migration of the ions to the tissues.

2. *Vasodilatation.* Another effect which accompanies and is due to the migration of ions, because it is the current, is a vasodilatation. By passing the galvanic current through a limb, or any tissue, you are able to increase the vascular supply as a result of the vasodilatation. You can prove that by wrapping one electrode around the calf, the other around the thigh and, after pass-



ing the current, noting the reading of a surface thermometer placed behind the knee. A rise of three or four or five degrees of temperature can be obtained. The popliteal space which is ordinarily subnormal in temperature, like many other parts of the body, will rise to a normal temperature as a result of bringing hot blood at normal temperature from other parts of the body and flushing the limb with it.

3. *Absorption.* The galvanic current is able as a result, in the migration of ions, direct or indirect, to procure certain clinical results. One is the aiding of the absorption of the fluid, and a second is the aiding in the absorption of inflammatory products, providing that the cause responsible for their appearance is no longer present. It aids the abolition of pain and spasm, again assuming that the cause responsible for them has come to an end.

4. *Sedation.* Although the action of the galvanic current on deep lying tissues in which there is pain or spasm or congestion is due primarily to the migration of ions, which is current, the exact connection between the current and the relief is not exactly ascertained. There are many possible explanations and one of them is the possibility that the galvanic current may cause movement in the tissues of toxic currents.

5. *Stimulation.* A Dr. Vivian Pour, who practiced in London about 1870, has showed that if a galvanic current is passed through a muscle artificially fatigued the passage of the current is followed by a quick relief of the fatigue. This he called the refreshing action of the galvanic current, without giv-

ing any explanation of it. It seems to me the muscular exercise caused a development of fatigue products. The galvanic current caused them to migrate, to pass into the lymphatics and to be removed from the muscle. Naturally that is theory.

#### PHYSIOLOGICAL ACTIVITY

I will descend now to actual practice and mention to you a few maladies which you can benefit by galvanic current. One of these is Raynaud's disease. This is a difficult malady to treat, and in old English textbooks they give a sigh at the end of the paragraph on treatment and say, "Electrical treatment may be of use," but they do not give any detail on how to apply it. The way one would immediately think of would be to have one electrode over one hand and one over the other. Far better results are obtained by including in the treatment of the upper extremities the cervical enlargement of the spinal cord, or if the trouble is in the feet, include the lumbar enlargement. Place the cathode or the negative over the cervical spine and the hands in a bath of warm water connected to the positive pole, apply a current of 25 milliamperes for twenty minutes, and reduce the severity and the frequency of the spasm.

To conclude, I will give one final example. If you apply your galvanic current to the brain, placing, we will say, the cathode over the forehead and the anode over the neck, and apply the current to begin with two or three milliamperes, increasing it day by day, or on alternate days, up to 12 or 15, you will in fatigued patients produce a feeling of refreshing exhilaration. That

treatment is of value and it was tried in many cases during the great war. It was tried in the case of a lady in London who said she felt so much better after it and her mind so much clearer that she insisted upon her husband, who was a judge, having some as well and clearing his brain.

The credit for the development of that form of treatment is due to Doctors Beard and Rockwell, who are famous electrotherapeutic pioneers of the past.

I am very grateful for your listening to me so attentively. I should recommend strongly that you include the galvanic current in your armamentarium because by its means you can produce results which cannot be obtained by other forms of treatment.

#### DISCUSSION

CHAIRMAN COULTER: I would like to ask Dr. Cumberbatch in treating a large scar of the back with sodium chloride ionization, just what would be his technique?

DR. CUMBERBATCH: I should moisten the scar with one per cent salt solution so as to get it thoroughly moist and place the electrode. I use a metal electrode which is separated from the

skin by several layers of toweling cloth, soaked in a warm solution of a one per cent sodium chloride. To complete the circuit place another electrode, larger in size, wherever you wish. That which is very convenient and saves a good deal of time is to put one leg into one of the receptacles of the so-called Schnee bath, with the electrode in the water, and increase the current gradually, taking three or four minutes to reach the maximum. When applying the galvanic current, it is essential to apply it gradually and steadily. Increase the current two or three milliamperes at a time and wait half a minute until sensation is no longer increasing; then take three to five minutes to get up to the maximum, letting it run for twenty minutes, gradually reducing to zero at the same speed. If you do that, the patient will tolerate much more current.

The maximum current which you can give depends upon the area of the electrode. For a large area you use a large current, for a small area a small current. You ought to talk not in terms of how much current you give, but how much current per unit of area. (Leduc was able, in certain regions, for instance the back where the skin was sensitive, to get up I think to one and a half milliamperes per unit, which is, of course, considerable density of current.) The treatment is repeated and will be continued for perhaps six to eight weeks. It is a benefit to precede by radiant heat and afterward by massage and movements.

## GALVANISM—ITS AVAILABILITY IN GYNECOLOGY\*

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**E**LECTRICITY, from the standpoint of physics, is a series of ratios. Every modality, practically, blends one into the other inasmuch as the difference between them is a difference in length and rate and direction of vibration.

I am asked to speak on galvanism and its application to gynecology. Galvanism, as you all know, has been considered at least the one medico-chemical current. We may assume that the other currents and modalities have chemical reactions also. We may assume that diathermy through its heat effects has a sedative effect. We may assume, in fact, we know, that the actinic rays have a directly stimulative effect on metabolism and function. Galvanism in its primary sense is a current, flowing constantly in one direction; its modification is the sine wave, slowly alternated, giving time for muscle and nerve tissue to respond. It becomes a chemical current depending for its effect upon its polarity. Then all one may need to do to understand galvanism and its effects is to understand the quality of the polarity, the positive pole and the negative pole of galvanism, to learn its reaction upon the body tissues with which it is brought in contact. One may then prescribe it intelligently.

In treating the conditions generally embraced in gynecology, the main things to be

done with galvanism are simply to restore lost and perverted function, to depress excessive function, to attack certain forms of neoplasm, and to return to as nearly normal as we may certain mechanical or other distortions of the female pelvic viscera.

You will find galvanism, then, a means of attack. In speaking of surgical diathermy, I could say frankly that in gynecological infections, as cervicitis, or in the other infections, I do not care whether they are gonococcic infections or whether they are some other infection of the cervix, we have in galvanism a means of attack which I believe from years of experience is perhaps safer, perhaps equally efficacious, as compared with diathermy. In the infections, then, with galvanism, plus ionization, a quality depending upon the polarity of galvanism, we may attack those conditions. We may bring about the same end result that we bring about with diathermy, either surgical or medical.

All that is obtained from galvanism in gynecology is sedation on one hand, bactericidal effect and stimulation of circulation on the other hand. Either a stimulation is procured or a retardation of circulation results. The cure of disease in these conditions, as the cure of disease elsewhere, depends upon the circulation or nutrition more than it depends upon any other one thing. In attacking disease, I do not care what it is, of what type or location, nutrition or the

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nourishment of the tissue is the main thing to be considered and measures should be designed to best bring it about.

#### DYSMENORRHEA

Just a little on technique. Let us assume a hypothetical case. There comes into the office a young woman suffering from a dysmenorrhea. Dozens of these cases are constantly being met by all practitioners and they can be treated easily. An examination, either vaginal or rectal, discloses a small, infantile uterus, either normally placed or perhaps partially or almost wholly retroverted. Galvanism, better than any other modality, is indicated. Through the negative pole, with its softening, relaxing and at times electrolytic effect on the canal, which is in most of these cases in a state of under-development, bring about a relaxation and dilation. The negative pole will increase the blood supply of these tissues, and blood supply means increased nourishment. Dilation of that narrow canal means relief of symptomatology, a clearing up of the dysmenorrhea. If further treatment is considered bring about with the sine current a gentle massage of the uterine musculature, which, plus stimulated circulation, will give you a rapid, increased development. Your case clears up, your patient is relieved, and the uterus returns to position in the majority of cases, unless there are adhesions or other pathological conditions present which have not been assumed in our hypothetical case.

Remember that I said all these cases need a complete physical examination. You cannot treat a case merely by galvanism with-

out finding out what the systemic condition of your patient is. Do not center your attention on one organ and neglect the associated organism.

#### AMENORRHEA

In amenorrhea we need stimulation of function, stimulation of circulation, plus attention to the general system. Yet local stimulation of the uterine zone means resumption of function in a majority of cases, provided it is combined with proper systemic treatment.

#### MENORRHEA

Switching to the opposite condition, in the menorrhagias vasoconstriction is indicated, using the contracting effect of the positive electrode. Using the positive electrode intra-uterine or, in a great many cases, intra-vaginally, will in many instances culminate the existence of the offensive symptom. If you cannot do it with this means physiotherapy should be abandoned in that particular case.

#### UTERINE FIBROMATA

There is another condition which I have treated for nineteen years and on which I am rather enthusiastic. That is the treatment of uterine fibromyomata. Dr. Massey and Dr. Pope, as you all know, have treated fibroids for a great many years. So have many other physicians in the United States, and usually they have treated them with great success. You will be amazed how many times with this modality a female patient may be distinctly benefited and kept in good health. There again the positive

electrode is the pole of choice. Here an intra-uterine positive is used, applying high milliamperage. Give as much as the patient can stand the first treatment or so, but rapidly step it up. It is amazing how these patients gain or establish tolerance to currents. I have started a woman with 20 milliamperes, and before I have gotten through I have had her up to 100 or 120 milliamperes.

Dr. Massey has used as high as 3,000 milliamperes of current in treating certain conditions.

I was asked this morning, "What is the end result?" I said, "The end result is good." And I mentioned a case of a woman who came to me when she was about four months pregnant. She had a uterine fibroid. One of our surgeons advised removal of the uterus, with its contents, stating that normal birth was impossible. She consulted me. I advised her to let nature take its course. She took my advice and was delivered of a healthy, normal child. She came into my hands about a year later for treatment. She was treated in the method I am describing, by galvanism, positive uterine pole, large negative abdominal pole, and the condition receded; she apparently, as far as any one could tell, cleared up very nicely.

The proof of the pudding is in the eating. Since then this woman has given birth to two healthy children, both being normal, and with no unpleasant symptomatology whatsoever.

I could recite other specific cases of six, seven, eight years' standing in which the pa-

tients have been going around in good health, with no symptomatology whatsoever.

#### SUBINVOLUTION

I recently had another case of a woman who had been flowing continuously for some six months. When I put my electrode into that uterus it traversed eight inches before reaching the fundus. When she was released from treatment it went in only two and seven-eighths inches. She went away with normal menstrual function, twenty-eight day cycle, four day flow, and it has continued that way ever since. I have a series of other cases in which six, seven or eight years have elapsed. That is just a matter of interest. It can be done, all reports to the contrary notwithstanding.

#### PELVIC CELLULITIS

Many cases come to us after a cellulitis with a good deal of retraction, distortion, pain, thickening of the broad ligaments, and all the other associated pathology. In those cases a technique was used consisting of ionization. A vaginal electrode was inserted and a vaginal tampon of cotton soaked in iodine solution was packed around it. A negative pole was placed in the vagina and a positive pole was used over the abdomen. The current was turned on, and switched to an interrupted current and sine current for the massage effect. Those old, thickened, fibroplastic conditions softened, loosened, the distortion was relieved, and in some cases the condition completely cleared up.

#### UTERINE INFECTIONS

In infections, ionization is the answer. In endocervical infection, endometrial in-



fection, use ionization with the positive pole. You can ionize mercury, you can ionize zinc, you can ionize copper. The best of all in these cases I have found to be mercury. First amalgamate the copper sound with mercury. This is just as effective as medical diathermy; an my end results have been fully as good as they are with straight medical diathermy.

This is the message that I have to give you. Galvanism is a valuable agent when used intelligently and on the basis of a full understanding of its polarity. A knowledge of its physics is essential, clearly understanding the action of its poles. This, plus head-work, will produce beneficial results.

#### DISCUSSION

DR. A. A. WILLMOTH (Louisville, Ky.): I have listened with a great deal of interest to the speaker. From many years' work I can fully endorse what he has said.

A number of years ago it occurred to me that there was too much surgery being done on women, and I was one of the fellows who was doing it. A woman had practically nothing offered her except the knife or a curette or some form of operation. Through the suggestion of your former president, and reading of the old book on "Conservative Gynecology," by Dr. Massey, I began the use of the galvanic current, and I am using it today and using it with splendid results. If you use it as the speaker just told you, remembering your indications and your polarities, you will be blessed with some of the most remarkable results that you will have in all of your practice.

I, too, believe that you can do more with galvanism in the infected endocervicitis cases than you can do with diathermy. I like the amalgamated copper electrode placed in the cervix with an amperage sufficient, usually 20 to 30, for

twelve to fifteen minutes, to drive the mercury into the tissues. If you do not believe that it does this, try it on a piece of beef and then split the beef and see how far you have driven the mercury. Copper will show you very plainly how far you have gone, by the green coloration. Remember you can do the same thing in the living tissue, and the results are little short of marvelous.

I know of no single agent in my office that I can use better than my galvanism. Why do you want to submit every woman who comes in to some form of operation? Surely something can be done for them besides the knife. Certainly the curette can oftentimes be beneficially replaced. In the curette you have a dangerous instrument. Here you have an agent that is harmless and does good. I say it is harmless. Let me modify that statement. It is harmless if it is properly used.

Again I voice the sentiment of the speaker who mentioned the soft, boggy, bleeding uterus. If you use a positive electrode, one that is as large as you can insert well into the uterus, and gradually turn on the current, not to 25 or 30, but to about five and gradually work up to as much as 120 or 125, you can contract the uterus down until it is solid. Not much is going to be done with 25 milliamperes. Get 70 to 100 or 125 and leave it on for ten or fifteen minutes.

You may have thought the doctor a little too enthusiastic when he told you about this. He was not. You can do the same thing. It is not hard to do. It just requires a little patience. You do not necessarily submit the patient to an operation. If one is advised and you can control the bleeding, you get an improvement in the condition for operation. I frequently control the bleeding until the patient is operable, until the hemoglobin comes up to a point that is safe. If you have to use radium on these women, supplement it with the galvanism. It acts about as fast, if you allow time for the radium to act. Control the bleeding in your office with the galvanic current. Bring the uterus down until it

is firm and solid. Often you will find that when you have done that the patient will not have to be operated upon. Frequently you can carry them along and they will get better and get over their condition. It will not give any further trouble and they will frequently avoid an operation.

I should like to emphasize what the doctor said about iodine. It is a daily occurrence in my office for treatments like this to be given. The results are splendid.

I have only one exception to take to the speaker's remarks, and I must take that one. He spoke of dilation for dysmenorrhea. I do not believe we have any obstructive dysmenorrheas. When you stop to consider that the menstrual flow occurs at the rate of three drops per minute, you can hardly conceive of any cervical canal that will not permit that passage. If you dilate with forcible dilatation you do not relieve them. At least I have never relieved in this manner any of my patients who complain of dysmenorrhea. I consider it more of a nervous condition, and dilation in any form is not going to relieve the woman. It may relieve her for one or two periods, but she will soon be right back where she begun.

I think the only case in which dilatation is indicated is that of the married woman where from some trauma the cervix is stenosed from cicatricial tissue. There you do good because it is a mechanical obstruction. In the average case in the young girl I do not think you get any benefit by cervical dilatation. You are dealing with a condition that is more far-reaching than the stenosis; it is not an obstruction, as we were taught at one time. If dilatation is indicated as in the stenosed cicatricial cervix, do it with the negative pole of your galvanism. You can start with a small electrode and low milliamperage, slow treatments, and dilate the cervix all you want to dilate it, as much as you can do with a forcible dilatation. You don't need any anesthesia. It can be done in your office without

any pain or discomfort to the patient, so that after treatment she gets up and goes home or to her occupation. If it is a dilatation that you want, do it with the negative pole.

DR. E. H. MARSHALL (Clinton, Ill.): In some of these old chronic endocervicitis cases, if you will use your litmus paper you will usually find an acid secretion. I have found, when I have that condition, until I change that to an alkaline secretion I do not get results that will last. This alteration in the reaction can be done very easily with galvanism. About three treatments usually will suffice, given at four or five-day or one-week intervals.

I certainly commend the paper and recommend the use of galvanism.

DR. J. U. GIESY (Salt Lake City): I certainly agree with Dr. Willmoth as regards the curettage. If you must curette a woman, do it galvanically, it is safer and easier, and it does not require hospitalization. Furthermore, it does not require anesthetization. All you have to do is take a copper sound, get it into the cervix, turn on the positive current through that sound, run it for ten to fifteen minutes, and then remove the instrument. The tissue will stick, but pull it out. The way to get it out is to pull it, and when it comes you see what is on it. You will be satisfied that you are getting just about as much benefit as from the average curette. You are getting a superficial coagulation and superficial destruction of the tissue and you are not going deep enough to make it dangerous. You are using a thing which is known to be highly germicidal in the tissues through which that current manifests its zone of effect.

There is one thing I hesitated to speak about at first, and I hoped it would be brought out in this discussion—that is the effect of drainage with the negative pole. Whatever softens and relaxes and dilates, the action produced by negative pole will relieve secretions which are locked up. It can be done in conditions of salpingitis, except that it must be done very,

very carefully, with a very weak intra-uterine current. Frequently you will get very great relief in your old salpingitis cases with the use of the negative pole through its relaxing effect, its permission of drainage.

Begin slowly in your menorrhagias; win your patient's confidence and her tolerance; work up as rapidly or as sensibly with those two conditions as possible to 75 or 85 milliamperes, and you can use that for thirty-five or forty minutes with perfect safety and get results.

With regard to dilation, the doctor quoted me only halfway, consequently I am going to take issue with him. If I did not make this statement, I wish to advise the use of a small sound. Get in, and continue to enlarge the canal under the use of other sounds, and you get two effects. You get a softening and a relaxation of tissue, and you get a direct stimulation of circulation. A stimulation of circulation means added nutrition, and that means added tone and gain in development of that organ, and you will find in nearly all of these girls suffering in that way from this type of dysmenorrhea, that there is a rather under-developed uterus.

In treating chronic endocervicitis, I begin with the positive pole, but very frequently after I have obtained what amounts to a local curettement, I switch over to the negative pole for a stimulating effect and get the same result that I get in the dilation of these other dysmenorrhea cases.

DR. WILLMOTH: May I suggest in order to make your discussion complete that you explain just how we put the mercury on the electrode.

DR. GIESY: That is simplicity itself. All you have to do is have a dental friend or a dental supply house furnish you the mercury by the quart or half pound the same as the dentists buy it. Get a bottle of about 25 per cent aqueous solution of sulphuric acid. Be sure you get a pure molded copper, that it is not nickel-plated sound. You can get it from any of the electrical manufacturing houses today. Be sure that your electrode is bright and clean, not corroded and neglected. Keep it bright and shiny. Then take the bright, shiny electrode and dip it into this solution of sulphuric acid. Then dip it into your solution of mercury. Or, if you do not want to break down your mercury so fast and want to be real economical, pour a little of it out on some surface, a chamois skin, or something like that, and rub the sound on that after you have dipped it in the sulphuric acid. You will get a coating of mercury. Wipe off any excess that stands up in globules until you get a nice, smooth, silver surface, and there is your artillery. Put that into the cervix, turn on the positive current, and you simply lay down a barrage of ions in that diseased tissue. It is the mercury ion that does the work, plus the driving and (if I may use this maligned word) "biochemic" effect of the galvanic current back of it that gives your results.

## INTERPRETATION OF THE DENTAL RADIOGRAM\*

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INASMUCH as the care of the mouth, from a medical and surgical point of view, has been my specialty for the past several years, the taking of and the interpretation of the dental radiogram has comprised a large part of my practice.

From my observations in this field, I am of the opinion that much of the so-called neglect of the mouth is due to the lack of knowledge of this organ on the part of the medical profession. Because of this lack of knowledge, the physician must depend upon others to make his diagnosis for him, and likewise interpret his dental pictures.

In a general radiological laboratory dental pictures are usually given very little consideration, for the lack of space does not permit of their being properly taken. The taking of dental pictures on a table is not conducive to the best results, and cannot be too severely condemned. Many laboratories are properly equipped and devoted to the taking of dental radiograms exclusively. It is also becoming common practice for the dentist of today to take his own dental x ray pictures.

From the point of view of receiving a medical interpretation from pictures taken by dentists, I would consider this a fallacy. To the physician a set of radiograms should carry with them a medical interpretation. The dentist who takes his own pictures usual-

ly does so in confirmation of his own work and not in criticism of it. His own cases referred to him for examination rarely have the teeth on which he has previously put the stamp of approval, re-examined by the x ray. The reason is obvious. Few dentists are competent to make a medical diagnosis, and of those who are, the minority are licensed to do so.

Medical diagnosis is out of the sphere of dentistry, but dental diagnosis is not out of the sphere of medicine.

Except for the visualization of the local conditions directly about various teeth, the majority of dentists are at sea in attempting an interpretation indicating the activity, or the inactivity, on the part of a picture of the pathological condition, and its relation to a medical problem. For this purpose there should be a more cordial relation and cooperation between the medical and dental professions. However, as it is not the purpose of my paper to bring such cooperation about, as much as I would like to, I shall digress no further and proceed to explain dental radiographic interpretation.

It is obvious that experience is necessary to recognize x ray conditions, dental or otherwise. Experience teaches what conditions may be pictured as a representation of the normal or abnormal. To make a proper diagnosis possible there are several details which must be considered. Observing these

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details and repeatedly finding associated with the same condition certain picturings, makes one more certain of his diagnosis. Thus the interpretative value of a finding is enhanced if it is found repeatedly associated with some common pathology or with a common symptomatology.

In the dental areas one pictures bone which is for the most part of alveolar type. In this type of bone the definition of the variation of structure is easily pictured. It should likewise be as easily detected. Alveolar or spongy bone is composed of thin bone walled cells, the arrangement of which does not seem to be definite in size or shape. Variations can be noted in the different positions. As a general rule the size of the cell varies with its position at the alveolar crest

about the promontories as ridges and spines. A similar packing arrangement of bone cells can be noted about the bone canals and foramina.

This rather general description is true of both the mandible and the maxilla. Repeating then, the bone cells are smaller and more compact at the median line and the alveolar crest than they are posteriorly. About the roots of teeth in either jaw, the same appearance of compactness is noted, and this packing of cells forms the socket wall or lamina dura.

A review of any standard anatomy will refresh one's memory on the various important canals and foramina in the jaws. Their position can be verified in dental radiograms. Their appearance and position

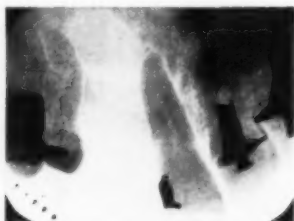


Fig. 1.—Active lesions remaining after tooth extraction. Note no limitation of area of infection, no apparent resistance pictured. These cases are found to be acutely toxic.

or nearer the mandibular border. A variation can also be noted between the size of the cells about the symphysis and those near the angle of the jaws. This difference must be recognized before interpretations of value can be undertaken. Again, the size of the alveolar cells varies about the tooth roots, where it forms a socket wall. The cells are smaller and more compact, forming a thin bone wall of greater density than the surrounding alveolus, yet less dense than the bone about the mandibular border or



Fig. 2.—Inactive lesions. Note how areas are circumscribed. Symptoms in these cases are of chronic toxicity. Acute symptoms may arise from gingival irritation which is to be noted.

as pictured from various angles is an important point to learn. It is because of the proximity of a pathological process to some foramen or canal, which in most instances carries important nerve structures, that many so-called reflex symptoms can be explained.

The teeth as they set in the different sockets surrounded by the thickened alveoli are of a definite size and shape and under normal conditions should show a consistent



similarity in appearance. This similarity should be such that a normal tooth should be recognized when pictured. Tooth structure is dense bone in character. Each tooth, if fully developed, vital and normal, is of individual shape, and its root is surrounded by a layer of peridental membrane which is of almost equal thickness at all points about the roots. The peridental membrane lies between the tooth root and the socket wall or lamina dura. Within the tooth root, there is a canal and in the crown of the tooth a chamber. This is the root canal and pulp chamber in which are found the nerve and blood supply of the tooth as long as it remains vital.

Let us consider for the moment the possibility of classification of the shadows we might see, and associate if possible, such classification with what can be seen under pathological conditions.

For the purpose of study, it has been my habit to describe three classes of shadow to be found in the dental areas. They are soft tissue, bone and foreign matter. These are graded as one, two and three. Each grade of shadow has a definite appearance, and under normal conditions finds just as definite situation. Gum tissue, soft tissue, is to be found normally over the alveolar process, within the root canals and pulp chambers of teeth and as the peridental membrane between the roots of teeth and the socket wall or lamina dura. This constitutes grade one shadow and is characterized by easy penetration of the roentgen ray and shows no structural markings, but its limitations are definite and fixed.

Grade two shadow is that of bone structure. It is a little more difficult of penetration than grade one or soft tissue shadow, and therefore registers a greater resistance on the dental film. The bone shadow about the jaws is of two distinct types: the alveolar and denser bone. The former is found in the jaw bone, while the latter in tooth structure and such anatomic promontories as ridges and spines on the bone surface. Grade two shadows or bone shadows are therefore divided into "a" and "b" classes. Grade two "a" being that bone of alveolar type and in which detail of bone cells or internal structural differences can be made out. Grade two "b" is that type of bone shadow which pictures denser bone than alveolar bone, as ridges or spines, etc. Most often this type of shadow has a definite position and shape, as a tooth, etc., and is pictured as an entity.

Grade three shadow embraces the shadow of all foreign materials used in treatment about the mouth and in the making of restorations. As a general rule these substances are of greater density and resistance to roentgen ray penetration than bone and can be detected by the lightness of the film reduction. These shadows are not constant in shape and are fairly easily detected.

Time will not permit a detailed and accurate description of each step to be taken in the making of a diagnosis from a dental radiogram, so in passing hurriedly I will say that each division of tissue as indicated by the two grades described has a definite anatomical position. It is also definite in extent under normal conditions. This is

also true of grade three shadow, that of foreign material. As fillings or bridges, etc., these shadows have a definite position and extent, their relation to the other structures of the mouth is important of understanding.

The study and interpretation of the dental radiogram becomes the study of the relation of the various grades of shadow as regards their relative position and extent. Their anatomical position under normal conditions is definite and fixed, their radiographic definition is just as fixed.



Fig. 3.—Well filled root canal with very little periapical change pictured.

Consider for the moment the radiogram of a normal tooth in normal position in the jaw and without filling: The tooth itself is pictured as a smooth, rather dense object, and of distinct outline. The pulp chamber in the crown, and the canal in the roots are just as definite and distinct in outline. Within the pulp chamber and root canal the shadow of their contents is pictured by a heavier reduction, indicative of greater penetration. About the tooth root there can be noted a thin shadow of soft tissue type. This represents the peridental membrane. It is, in shadow, continuous with the shadow of the gum tissue, and dips into the alveolar process, about the tooth root and between it and the socket wall or lamina dura. The

surrounding shadow should be of alveolar type.

Next let us consider a tooth similar to the one described but in which the pulp has become putrid. If the condition of the pulp is a recent one it may defy detection except to the expert in dental radiographic readings, for the only possible visible picturing is a variation in the depth of the shadow of the pulp chamber and root canal contents. They assume a darker and more clear cut appearance than a corresponding normal or vital tooth should picture, and can only be detected by comparison. As the putrid condition continues, changes take place at the apex of the tooth where the vessels enter the canal, and here a thickening of the soft tissue shadow (grade one) or peridental shadow takes place. This is, of course, at the expense of the alveolar shadow. In consequence the lamina dura shadow which should surround the root and should be pictured evenly about the root, is made irregular. This destruction may be small or large, but in either instance is usually easily visible, because of its alteration of the even thickness of the membrane shadow.

In the instances of an untreated putrid pulp condition (and the majority of teeth pictured with putrid pulps are of long standing and without local symptoms) there are two varieties of findings to be noted. The periapically destructive type without any pictured attempt at being circumscribed, and that type in which a definite area of bone thickening can be made out. The significance of these different findings is that in the first instance the process continues to

be toxic, while in the second the individual offers a greater resistance and the process is not so toxic. To make an interpretation of diagnostic value and the determination of the effect of the pictured condition on a subject one must at this point coordinate the radiographic findings with the history.

It might be well to say that if a dental film is studied by shadow value, or shadow grade as described, that such a shadow grade takes on a definite shape and a definite limit of extent and position, which is to be considered normal. Any change in shape or

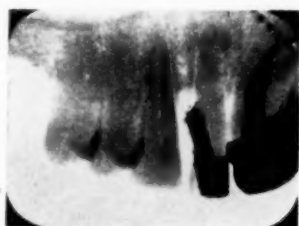


Fig. 4 and Fig 5.—In illustration of types of irritations discoverable. Note that the position, size and shapes of the shadows of grade 3 type (foreign matter) do not conform to what should picture a proper filling to rebuild or replace tooth structure or a tooth margin. In Fig. 5 note the lack of complete approximation of the filling in the second molar. An indication of progressive decay.

position alters the shadow relation, and a study of just what change or substitution of shadow has taken place is of value in the interpretation of the pathological change, and is indicative of the pathological process taking place. It is also an index of what symptoms are to be associated with the finding.

Should the pictured area of altered shadow relation be in a position near an important nerve trunk, blood vessel or sinus, it is necessary to determine what the possibility of the further continuation of the de-

structive process may be on these important structures. In the majority of instances the tissue between a tooth root and a canal carrying nerve trunks or blood vessels or a sinus is of alveolar character and is registered on the film as grade two "a" shadow. This is characterized by the regular mottled appearance of alveolar bone shadow, where penetration is alternately registered through denser and softer tissue.

Clinically there is a difference in instances where the symptoms are produced by a toxemia and conditions produced

through direct irritation of a nerve trunk. If such symptoms arise from a focus about a tooth apex it is possible to differentiate them in many instances. The toxic focus will in the majority of instances be pictured without a well defined area of denser or resistant bone shadow defining the extent of the destruction. There does not seem to be any pictured resistance to the passage of the toxic matter directly into the circulation. From such a process the symptoms are more apt to be of the acutely or sub-acutely toxic type. In the instance of the finding of a well circumscribed area about a tooth apex, there may be no symptoms referable to a toxemia or infection, until the process attains a size or develops into a position that it may cause pressure on an adjacent nerve trunk or blood vessel.

I wish to describe a process about the teeth which I have observed, and which I do not believe has any local pathological significance, but is a local expression of a systemic condition. In my description of teeth of this character before the Orleans Parish Medical Society, I mentioned it as my opinion that teeth such as these show their changes as a result of a systemic toxemia, of the arthritic type rather than their



Fig. 6 and Fig. 7.—In illustration of the condition described as existing about vital teeth. Note that thickened area is pictured as surrounded by peridental membrane and lamina dura of normal thickness.

being the cause of the arthritic symptoms. These teeth picture a normal appearing pulp chamber and root canal, and the normal appearing socket wall or lamina dura can be made out surrounding the greatly enlarged roots. These teeth are vital in contradistinction to bulbous roots on devitalized teeth. In the latter instance the thickening is the result of local infection about the root apex, or in the pulp chamber or root canal. In the former instance the root enlargement is symmetrical over the entire root and not alone at its apex. It has been my experience that the patient was not benefited by the removal of such teeth where their vitality is retained. If patients presenting such teeth as described, and others where periapical alveolar absorption is pictured, the latter teeth, those in which vitality has

the been lost, should receive the attention of the surgeon, rather than the former.

You will perhaps agree with me that it is impossible, in the scope of a paper of this length and character, to outline in detail many of the conditions that are possible of diagnosis. I will, therefore, make one further point before closing.

The recognition of the position of teeth is not a difficult process. It is essential, however, before any interpretation of value can be attempted, and certainly before surgery be attempted. In illustration of that point I will cite an instance in my practice.



A lady was referred for the removal of an impacted unerupted lower left third molar. She explained that she had her picture taken by her dentist at home and she had the pictures with her. After a hasty examination of the picture which she produced, there was noted a small portion of the crown of a tooth impacted against a molar. In examining the film, it was discovered that if the relation of the teeth was properly pictured, the impacted third molar would have to be on the right side. The patient informed me that no pictures were taken on the right side, the only one taken being that on the left side, the copy of which I had. It was impossible to reconcile the picture in question to the position of an impacted molar in the lower left side. Other

pictures were taken. It was found that the unerupted tooth in question was a second bicuspid on the left impacted backward against a first molar.

Among other important features necessary to the making of a correct diagnosis from a dental radiogram, is the taking of pictures from correct angles. In most instances only a small part of the film is in a proper enough relation to be read with accuracy. The reading of a distorted picture or an improperly developed picture is pure guess work. A guess is not wanted, for one can guess as well if not better without a picture. Pictures must be located properly as to the area being pictured. They must be diagnosed with consideration given to root position, as well as the relation of restoration. Fillings should be carefully examined for rough surfaces and the possibility of their causing irritations. Un-erupted and supernumerary teeth, as well as impacted teeth, should be looked for. The pathological significance of such findings should be more thoroughly studied.

In summarizing I will say that in my opinion the taking and the interpreting of a dental radiogram is an important branch of medical diagnosis. As such it should not be neglected, as it often is on the part of those doing general radiographic work. The diagnosis should not be based on a single radiogram of one tooth.

Dentists are for the most part doing their own radiographic work. Those who do, most often do so to check up on their dental work. Their medical diagnosis is incompetent. It is, therefore, not to the best in-

terest of a patient to ask that pictures be taken by the dentist who cared for the case.

Shadows produced on the dental film lend themselves to easy classification and those parts to be found under each classified shadow have a definite shape and position, so that variations can be detected. The detection of variations and the knowing of their pathological significance is of interpretative value.

Finally, it is my further opinion that much more can be learned from a dental radiogram than is being commonly learned now.

#### DISCUSSION

DR. A. F. TYLER (Omaha, Neb.): I have been very much interested for several years in following the work of Dr. Lurie in the interpretation of dental pathology by means of the x ray pictures. The classification which he has given you this evening I think is very helpful in the interpretation of dental pathology, because it gives us a normal standard by which to judge pathological tissue.

There is one question I would like to ask the doctor. In the film which he showed with the increase in density of the shadow around the root which made the tooth have the appearance of a club root, I would like to ask whether that same condition ever follows long continued mechanical trauma.

I want to ask him also about the same shadow as to whether he thinks that increase in density is due to a thickening of the peridental membrane or whether it is due to a thickening of the alveolar bone.

DR. ROY W. FOUTS (Omaha, Neb.): As I look back over my earlier days I shudder somewhat, in the light of some of the things I have learned in the last two or three years. I have



a dentist right across the hall from me, and I have had occasion to follow my cases through and observe just what the pathological condition was following extraction of some of the teeth that I had previously been in the habit of condemning, and here of later years also some that I formerly had passed.

I want to concur quite heartily in the doctor's statement that it is a medical man's job, and the job of a medical man used to interpreting these dental films with an opportunity to follow them through and see what he gets when the tooth is extracted, in order to be able to properly evaluate a dental picture.

DR. WILLIAM LURIE (New Orleans, La.): Relative to Dr. Tyler's question about trauma, when a tooth thickens as the result of trauma it is rarely symmetrical along the full length of the root; it is more apical, well within the apical third, and in such instances there is also a correspond-

ing thickening within the alveolar process. One does not see it as was shown in the picture where the tooth root itself is thickened and the alveolar process surrounding it just outside of the lamina dura retained its normal appearance.

His second question was relative to the shadow and whether it be in the peridental tissue or in the alveolar process. I can answer that by saying if one just follows out the study of the tissue Grade, he will find if it is alveolar process, it is a bone shadow, the thickening is within the bone shadow and there is a greater density of bone structure; if it were in the peridental membrane, the tissue shadow of Grade 1 or soft tissue shadow would be increased at the expense of the bone shadow. That was illustrated perhaps better by the two slides that showed the foreign matter within the alveolar process and a great thickening or increase of the white ring surrounding the foreign matter.

### WATER AS A THERAPEUTIC AGENT\*

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**W**ATER has been recognized as a hygienic medicine from the earliest times. Hippocrates, Celsus and Galen used it extensively in the treatment of acute diseases, and during the Middle Ages many physicians of prominence advocated its use. During the Eighteenth Century the value of water in the treatment of diseases, especially those of an acute character, was brought very prominently to the attention of both the medical profession and the laity by Vincent Priessnitz, a farmer boy who at the age of 13 sprained his wrist and success-

fully treated it by pumping cold water over the affected area, then applying a wet bandage which he rewetted as it became dry. This treatment promptly reduced the inflammation, but a little later a rash developed underneath the bandage. A short time after this the boy crushed his thumb; he again applied the same method of treatment which had so effectively relieved his sprained wrist, and with the same results. From these observations Priessnitz reasoned that the rash was an indication of an impurity in the blood, and having made a series of observations in regard to various

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wounds and ulcers on the persons of his neighbors, he deduced the theory according to which disease is caused by an accumulation of morbid matter which must be eliminated from the system by the application of cold water and the observance of a strict regimen. His views were further confirmed by a later accident to himself in which he received some broken ribs and severe contusions by being run over by a cart. So severe were these injuries that the attending physicians despaired of his life, and when Priessnitz learned of this he at once removed the bandages and applied others wet with cold water. The broken ribs were replaced by deep inspiration while pressing his abdomen against the window sill. Whether because of this method of treatment, or in spite of it, the patient fully recovered, firmly convinced that his method of treatment was solely responsible for the outcome. As a result of these experiences Priessnitz became thoroughly convinced that his theory with reference to the curative effects of cold water was correct, and made its application the chief object of his life. He made a close study of various methods of applying cold to the body and rapidly invented the sponge bath, the wet sheet pack, the sitz, foot and arm baths, the douche, the dripping sheet, the plunge, the dry blanket pack and many other procedures which are in use at the present time.

So rapidly popular did this method of treatment become that Priessnitz in 1829 established in his native village of Grafenberg a cold water cure, which rapidly acquired such a favorable reputation that visitors were attracted from all parts of Eu-

rope, and the Austrian government lent him its patronage. Notwithstanding the fact that the medical profession opposed his work, it grew so rapidly and became so popular that it was soon necessary to greatly increase the size of the original establishment at Grafenberg in order to accommodate the rapidly increasing patronage.

While Priessnitz was very successful in relieving many ailments by the use of cold water, we know that his methods were somewhat empirical and that his theory with reference to the cause of the accompanying rash was fallacious. However, he was a keen observer and noted carefully the ability of his patient to react to the applications of cold, and treated them accordingly.

The trained hydrotherapist of today has no better single means at his command for basing his judgment on the intensity of treatment applicable to any new case. The recognition of this single fact will enable any intelligent physician to obtain satisfactory results in many cases where other measures have not proved successful.

The beneficial results obtained by Priessnitz in the use of cold water as a curative agent were so outstandingly successful that the medical profession was soon compelled to recognize its value, and started investigations which placed its use upon a scientific basis.

The invention of the clinical thermometer by John Hunter made it possible to study in a scientific manner the effect of thermic applications to the body.

Currie and Jackson of England were the first to take advantage of the opportunity afforded by the use of the thermometer to scientifically study the effects of water in fevers. Early in the eighteenth century they made such valuable contributions relative to their observations that the medical profession at once recognized their value. However, these facts seem to have been lost sight of for a time and it was not until the uneducated farmer boy of Grafenberg, whose empirical though successful use of cold water attracted universal attention, that its use became popular.

Early in the nineteenth century a number of physicians, including Lockette of Virginia, Fleury of France and Bell of Philadelphia, made important scientific contributions to the subject. In 1874 Schuller published his observations on the effects of thermic applications on the circulation as observed on trephined rabbits. Vinaj in 1892 confirmed Schuller's observations by similar experiments on a human brain which had been exposed by an accident. These observations of Schuller and Vinaj laid the foundation for our present knowledge of the effects of cutaneous thermic and mechanical applications upon the circulation of the viscera. From these and other observations it was soon learned that the physiological effects of water are due to qualities which enable it to be used as a nutrient entering into the composition of every portion of the body and serving a useful purpose in nearly every function, especially as a conveyor of food material to the tissues and a remover of waste materials from the body; also as a means of conveying heat

to and from the body by contact; also as a means of producing certain mechanical and pecutient effects.

Other agents capable of impressing the system in a similar manner will produce like effects, for example, hot and cold air, vapor, electric light, sunshine, massage administered manually or mechanically, vibrations, etc., and because of the similarity of effects these agencies are frequently used in conjunction with hydiatic procedures.

We all recognize the fact that we do not cure disease, we simply assist nature in her curative efforts. When disease is present it is recognized by certain symptoms which are the result of an abnormally functioning organ or group of organs—there is usually evidence of over functioning or under functioning, over stimulation, under stimulation and our efforts to assist nature must be directed toward controlling the pathological conditions which give rise to the symptoms by means of which we recognize disease.

Water, because of its peculiar physical characteristics, possesses a very wide range of therapeutic values and readily and effectively lends itself in its varying forms and degrees of temperature as an effective stimulant or sedative as occasion requires. It has remarkable power to absorb and communicate heat. It is also a universal solvent, and its physical state can be readily changed from a liquid to a solid or to a gaseous form. These versatile properties, together with the fact that it is universally present and is available in all of its forms at a comparatively small cost, makes it an invaluable remedy.

In considering the principles involved in the use of water as a remedial measure, the writer has nothing new to offer nor does he expect to add any additional facts to those already possessed by the well trained physician, but rather to help him organize the knowledge he already possesses in such a manner that the use of water in the treatment of disease will appear to him as a perfectly rational procedure.

It is common knowledge that water has been taken as the standard of "specific heat," because it is capable of absorbing more heat for a given weight than any other body—a pound of water contains five times as much heat as an equal weight of glass; nearly ten times as much as an equivalent weight of iron, zinc, copper or brass; and thirty times as much as the same quantity of mercury, gold or lead. Because of the large percentage of water in the body, its specific heat is nearly that of water, being nine-tenths as much.

There are numerous pathological conditions in which it is of very great importance to be able to communicate heat or to remove it from the body, and the readiness with which water lends itself for these purposes makes it a remedy of the highest importance. In fact, we know of no other substance which is at all capable of replacing it for these purposes. The ease with which water gives off or absorbs heat, together with the fact that it can be so readily obtained and applied equally well to a limited or extensive area of the body, as the case demands, makes it the most valuable substance that we know of for the purpose

of making thermic applications of either heat or cold to the human body.

For therapeutic purposes water is usually employed in its liquid state, but may also be employed to advantage in many cases in the form of ice or vapor.

If we do not take into account any change in heat production or elimination a body immersed in a quantity of water equivalent to its weight, the water increasing in temperature one degree, it will be found that the temperature of the body has been reduced approximately one degree.

This principle is well illustrated in a very practical way in the use of the Brand bath in the treatment of typhoid fever, which reduced the mortality rate in this disease from 25 per cent to less than 4 per cent.

The range of temperatures employed in hydrotherapy are usually within the limits of 32°C to 140°F. In surgical procedures, temperatures below 32°C and above 160°F are sometimes used, but should always be used with the utmost precaution because of their destructive effects.

Heat and cold are relative terms, being recognized as cold only when the temperature is below that of the skin to which the application is made, or hot when the temperature is above that of the skin.

For convenience of description, certain terms have been adopted to signify the range of temperatures applied. These are as follows:

Very cold .....	32- 55°F.
Cold .....	55- 65°F.
Cool .....	65- 80°F.
Tepid .....	80- 92°F.

Warm .....	92- 98°F.
Neutral (temp. of skin) .	92- 95°F.
Hot .....	98-104°F.
Very hot .....	104°F. and above

Water is also a very good conductor of electricity and renders valuable service as a vehicle for the general administration of the galvanic, faradic and sinusoidal currents to the surface of the body. It is also the one universal solvent. It is the vehicle which carries the foods rendered soluble by digestion to the tissues for assimilation and also the vehicle by means of which the effete matters resulting from catabolic activity are conveyed to the kidneys, liver, skin and other secretory organs for elimination from the body. As a cleansing agent it has no equal, not only for the external surface of the body, but for the interior as well.

In its liquid state it can be applied to the body in a large variety of ways by the different forms of immersions, compresses, douches, showers, packs, etc. The readiness with which its temperature may be varied makes it possible to secure a wide range of thermic effects, in addition to these pressure effects may be obtained through the use of various mechanical devices.

The physiologic effects of thermic applications to the body depend for their efficiency upon the fact that the skin is reflexly connected with the interior of the body, each portion of the skin periphery being associated through the nerve centers which supply it with nerve fibers, with some visceral periphery or vascular area.

So intimately is the nervous system related to all parts of the body that should all

other tissues be removed the normal contour of the body as a whole, as well as that of every organ, including the circulatory system, would remain.

The same statement with reference to the intimate relationship existing between the circulatory system and all parts of the body is equally true.

The principle physiologic effects of thermic applications to the body are the result of changes produced by them by virtue of their influence on the circulatory system through the impressions made upon that part of the nervous system located in the skin, namely, the cerebrospinal and sympathetic systems.

It should also be borne in mind that accompanying the reflex effect there is also a mechanical effect usually of a reverse order produced. The real effect of such an application depends upon the relative intensity of the two actions—the reflex and the mechanical.

The primary and intrinsic effect of cold is depressant, its secondary or reflex effects are stimulating.

Low temperatures inhibit protoplasmic activity, a fact beautifully demonstrated while studying the interesting movements of an ameba on a warm stage under the microscope; when a drop of cold water is added the movements at once cease, to be resumed again by the addition of warm water. The principle of the depressing influence of cold is used to great advantage in the preservation of food, the putrefactive organisms being unable to multiply and pro-



duce their toxins at a temperature of 32°F. or below.

The effects produced by applications of various temperatures to the surface of the body depends upon their manner of application, extent of area involved and length of time.

When cold is applied to the body, the immediate effect is sedative in character, and the longer the application the more pronounced the depression of function. Sooner or later, however, if the cold application has not been sufficiently prolonged to devitalize the parts, activity again returns, even to a greater degree than before the thermic application—this phenomena is termed reaction. In the normal individual, short cold applications energetically applied are usually followed by a decided reaction which increases physiological activity to a marked degree. In such instances the dominant effect is tonic.

Prolonged cold applications are dominantly sedative in their effects, resulting in diminution of physiological activity. Cold water is a true physiological tonic—unlike medicinal tonics, it excites the activity of the nervous system without the impression of extra burdens upon any vital organ, or hampering the activity of any function.

The physiologic effect of hot applications to the body, like those of cold, depends upon the degree of heat, duration and intensity of application.

Moderate heat, 100-104°, produces reddening of the surface, higher temperatures produce pallor of short duration, being fol-

lowed by a dusky redness, similar results are obtained when heat is applied to the mucous membranes except that somewhat higher temperatures are required to produce the results.

The general hot bath increases cutaneous secretion and respiration, thereby increasing radiation, with lowering of bodily temperatures, provided the bath is of short duration.

As the physiological effects produced by thermic applications depend upon the difference in temperature of the skin and that of the application, the value of heat in conjunction with that of cold is apparent. Heat prepares the skin for the cold application, thereby a tonic. This is a fact of very great importance in the therapeutic application of water.

The circulation is readily affected by means of heat applied to the body, its first effect being a notable increase in the force of the heart beat, accompanied by a temporary slowing. If the application is continued the surface vessels dilate and there is a greater volume of blood flowing through the skin, and the final effect of the hot application is to lower arterial tension and increase the heart's action.

General applications of heat increase the rate of respiratory movements, and greatly lessen muscular irritability, which is accompanied by a feeling of fatigue.

Very short hot applications, however, are very effective in relieving exhaustion.

Heat may excite or exhaust the nervous system, according to the mode of application.

The neutral bath, 92-95°F., has a decidedly sedative effect by reducing nervous irritability.

Applications of 100° or over are at first exciting, but later become exhausting in their effects.

Special reflex effect may be obtained by application of heat to certain cutaneous areas, which are reflexly related to the internal viscera. These effects are brought about through impressions made upon the sympathetic nervous system.

To obtain these effects, heat may be applied either alone or in conjunction with cold applied alternately in the form of a douche, spray or shower. The effect produced is either that of vasodilatation or constriction, according to the degree of heat employed. Warm or hot water produces dilatation, while very hot water, 115-130°, produces constriction.

A number of prominent investigators have carefully worked out the topography of this reflex action with reference to the more important internal viscera, and have charted the surface areas upon which we can make applications to obtain the effects desired. The most important of these are as follows:

1. The face and back of the neck are related to the brain.
2. The cervical portion of the spine, the chest and the shoulders are intimately associated reflexly with the lungs.

3. The hands and feet are associated with the brain, mucous membrane of the nose and organs of the chest.

4. The middle dorsal region is associated with the stomach.

5. The breasts are associated with the uterus.

6. The lumbar region is associated with the kidneys.

7. The lower lumbar region is associated with the uterus and lower extremities.

8. The internal surfaces of the thighs are associated with the uterus.

9. The plantar region is associated with the uterus.

10. The feet are associated with the kidneys.

11. The lower third of the sternum is associated with the kidneys.

12. The skin over the liver, spleen, stomach, bowels and bladder is associated with the corresponding organs.

#### SUMMARY

The effects produced by heat and cold may be summarized as:

1. An elevation of body temperature is accompanied by increased metabolism.
2. A fall in temperature is accompanied by decreased metabolism.
3. Short cold applications cause rise of temperature and an increase in metabolism.
4. Prolonged cold applications cause fall in temperature and decreased metabolism.
5. Short hot applications cause a fall in temperature with diminished metabolism.

6. Prolonged hot applications cause rise of temperature and increased metabolism.

7. Neutral baths do not alter either temperature or metabolism.

8. Cold baths increase, and hot baths decrease the alkalinity of the blood.

9. Warm baths decrease the acidity of the urine.

(In the preparation of this paper Kellogg's work on Rational Hydrotherapy was freely consulted.)

#### DISCUSSION

DR. CURRAN POPE (Louisville, Ky.): It is always a pleasure to hear some one arise and speak of the oldest known method of physical therapy. Indeed, hydrology and perhaps massage manually given are the two oldest measures of which the human race knows that have been used in the treatment of disease.

I am naturally very much interested in hydrology. With the exception of Dr. Stewart's distinguished chief, Dr. Kellogg, I am the second oldest hydrologist in America. I have seen what it will do, and know that if I were limited to the use of one physical measure in the treatment of disease, I would choose water, undoubtedly.

History is always interesting, and, as I have said elsewhere, it has sometimes been the so-called quack and charlatan who has compelled the recognition of a useful measure by the profession itself. I say that to our shame. This great quack Priessnitz, with his enormous institution harboring at one time I believe 1,700 patients, established the mecca for those who wished to understand the application of hydrology. It was to this place that Fleury came, who afterwards raised the modern use of the douche to such perfection after his return to Paris.

I was glad to note that Dr. Stewart mentioned our own distinguished Bell. Even to this day

the perusal of Bell's old book, a copy of which I fortunately ran across about fifteen years ago, affords very great interest, and it goes to show how in those days men who lacked the instruments of precision that we have today were able to work out so many of the problems in their keen clinical observation.

The doctor spoke of the Brand bath and of its temperature reducing qualities. No one who reads the history of the Brand bath in the reduction of the mortality of typhoid fever in ten thousand cases to a little over three and a half or under four per cent, taking the cases as they came and losing no case taken, if I remember correctly, before the fifty day, can fail to realize that this is a marvelous record and cannot be equaled by any method of therapy today for typhoid fever. But the Brand bath's object is not the reduction of temperature; it is a bath given according to the method of Brand in which friction is employed somewhat vigorously so as to produce dilatation of the cutaneous vessels while the patient is in the bath, and its great value comes in its ability to rouse the nervous system and to enable the emunctories to destroy and throw off the toxins of the fever.

In England and on the Continent the use of hydrology is very much more extensively employed than in America. I think the time has come when we must as physicians rouse ourselves to the value of this method and employ it. No one who has seen the value of it in tuberculosis or in chronic diseases of all kinds would be willing for one moment to be without the marvelous advantages that can be obtained from this method.

Heat on the periphery, as the author tells you, dilates the blood vessels. This is particularly true where the water is moving, for all mechanical stimulation increases the thermic influence, no matter what it may be. That is equally true of cold. One can stand a great deal lower temperature where the water is moving and mechanically striking the body than where he plunges into a bath and has to simply trust to his own

inherent reactive powers without the value of mechanical or percussive effect upon the cutaneous surface.

In the treatment of chronic diseases we apply alternately heat and cold, preferably. The object of all the treatment is to produce the condition known as reaction. Your heat starts the column of blood to the cutaneous surface and the blood vessels dilate. With the impact of the cold upon the surface, these blood vessels contract tightly even to the point of producing so-called goose flesh, and if the application is properly gauged, and it can be gauged to the most delicate, the most frail, the weakest of individuals, that is where knowledge and art and science combine.

In these conditions, unless reaction is secured, the whole process is defeated. Primarily heat distending the vessels, cold contracting them tightly, reaction or a reflux of the blood to the surface, producing a tonic dilatation or, I may express it, an intermediate state of dilatation of the cutaneous surface vessels that is maintained for long periods of time.

Very few doctors realize the value of a neutral bath, and a neutral bath can be taken in nearly any home in the country nowadays. I again state what I have so often stated, however, that I am absolutely against a bath tub. It is the dirtiest way of getting clean that I know of, washing all the dirt off the surface and the oily substances of the skin into the water and getting up and trusting to the towel to wipe them off. But if you have a bath tub in a home, you can oftentimes prescribe a neutral bath. A neutral bath should be prescribed by telling the patient to buy a thermometer and test the temperature of the bath, ranging as it does from ninety-two to ninety-six degrees. We oftentimes start with ninety-eight and drop down to ninety-six and ninety-four and ninety-two, allowing the patient to rest quietly in the bath. This neutral temperature, by shutting off impressions from the periphery, quiets the nervous system, just as

closing the eye and plugging the ear in Strimple's celebrated cases, the patient having no access to the external world save through one eye and one ear. When these methods of access to the external world were closed, the patient went to sleep. So by shutting off impressions from the periphery in the neutral bath, you sedate the nervous system, and this is often much better than giving strong hypnotics.

Again, you will note the interesting statement made by the doctor of close relationship between the hands and feet and the nose and upper air passages. This is the explanation oftentimes of why many people, as the saying goes, catch cold. Oftentimes that can be overcome if you find your feet getting cold. Physiologically, you can by contracting them or contracting your hands, prevent the flux of blood to the nose and other passages. When this flux occurs, owing to the presence there always of bacteria, we are very likely to have an infection started.

Remember that in the alternate hot and cold application, as shown by Vinaj and Magiora, you add thirty-three and one-third per cent of muscular strength to the individual. Do you think that Mr. Jack Dempsey or our old friend Zbyszko would go into the ring without the hot and cold shower and rub-down and let his opponent do so with the advantage of thirty-three and one-third per cent more muscular activity and with the side issues of a more active circulation both of the blood and lymph channels? Not much. Nor does the active trainer in the squared arena ever fail to refresh his fatiguing fighter by the use of cold to the nape of the neck and cold to the upper chest. Many people wonder why they rub a prize fighter with a piece of ice on the nape of his neck and cervical spine. They little dream that from long practical experience they have learned that cerebral circulation is better and that the cobwebs of a short hook to the jaw are frequently wiped out by this simple application. It can be said truthfully that there is no tonic or group of tonics in the whole pharmacopeia, single or combined, for the sick or

well that can equal what we hydrologists commonly call tonic hydrotherapy, that is properly applied cold applications.

DR. CHARLES E. STEWART: I want to thank Dr. Pope for his generous and scholarly discussion of this important subject. With light, water

and electricity we believe the intelligent physician has at his command a triad of remedies that are not equaled by any other for the purpose of modifying physiological function in such a manner as to tend toward the establishment of a normal condition.

## THE ROENTGEN RAY—A HISTORICAL SKETCH

ALBERT F. TYLER, B. Sc., M. D.  
Omaha.

THE story of the discovery of the x ray and its present day development is one of the most romantic tales of science. Wilhelm Konrad Roentgen discovered a ray having the power to penetrate objects opaque to ordinary light. This power was revolutionary in character. It is doubtful whether Roentgen himself at first fully realized the significance of his accidental discovery. For the discovery of the x ray was an accident, but the logical mind of the great scientist, Konrad Roentgen, saw the possibilities of this new manifestation of light and followed it to fruitful conclusion.

Professor Roentgen, working as a physicist at the University of Wurtzburg, was at the time interested in making certain investigations concerning the Crookes and Geissler tubes. These tubes are glass bulbs into which have been sealed metal electrodes and from which most of the air has been exhausted. It had been observed that when an electric current was passed through a vacuum tube of the Crookes or Geissler type the tube became luminescent and a beam of distinct individuality passed across from anode to cathode. Much curiosity had been

aroused among scientists as to the exact nature of the phenomena going on within the vacuum tube.

Professor Roentgen was diligently working in his laboratory one day with the Crookes tube when he was hastily summoned from the room.<sup>1</sup> He laid the still glowing tube on a book he had been reading, in which a large flat antique key had been placed as a bookmark. Through a strange coincidence the tube and book lay on a photographic plate holder. Returning later to the laboratory, he gathered up this plate holder, with several others, and went for an afternoon walk where he could enjoy his hobby, photography. On developing the plates made that afternoon he noticed one showed the image of the antique key. He wondered how the shadow of the key could have been put on the plate. He showed the negative to his students, but none of them could give a satisfactory explanation. To the solution of this problem Roentgen set his scientific powers.

On another day while working with the

1. We are indebted to Dr. T. S. Middleton of Chicago, who was a student in Roentgen's laboratory at the time the x ray was discovered, for the following incident.



Crookes tube in a darkened room some crystals of platino-barium cyanide lay on a nearby table. He noticed when the electric current was turned into the tube the crystals began to glow with a greenish fluorescence. When the current was cut off the crystals ceased to glow.



Wilhelm Konrad Roentgen.

The curiosity of the scientist aroused, Roentgen brought the crystals closer to the tube and they glowed more brilliantly; when he moved them further away the glow was lessened.

Again Roentgen placed some of the crystals on a piece of cardboard and interposed

his hand between the tube and the crystal coated cardboard and, behold! he could see the bones in his hand. It must be a form of light, so he called it the x ray, using the mathematical sign for an unknown.

Following this romantic discovery, Professor Roentgen worked until the end of the year 1895 before he consented to make public the results of his investigation. On December 28th, 1895, before the Wurtzburg Physicochemical Society he read a paper entitled, "A New Form of Radiation," announcing to the world the discovery of a form of light which had the power to penetrate objects opaque to ordinary light. This announcement was published in the newspapers of the world as a wonder of science. The idea of the discovery as it appealed to one cartoonist is shown in figure 2.

The value of the x ray in every day life was quickly grasped by the medical profession and even before the public announcement had been made by Professor Roentgen physicians were locating metallic foreign bodies and making pictures of broken bones.

Indeed, Mr. G. W. Holdrege, then a student at the Boston School of Technology, still has in his possession a print made from an x ray picture of his own hand taken in October, 1895.

Mr. P. H. Patton, connected with the engineering department of the Northwestern Bell Telephone Company, has in his possession the print made from an x ray picture of a child who had run a needle in her foot. This is the first medical use of x ray made in Omaha.

In 1898 a static x ray machine was exhibited at the TransMississippi Exposition, Omaha. Following the exposition two Omaha physicians, the late Dr. J. P. Jensen and Dr. John P. Lord, placed x ray machines in their offices. Many other physicians, throughout the United States and other countries, were using the x ray, too.

#### ROENTGEN'S LIFE

Roentgen was born in Lennac, in Eastern Prussia, March 27, 1845.<sup>2</sup> It was planned

<sup>2</sup> I am indebted to Dr. I. Seth Hirsch for the following brief biographical sketch. *Journal of Radiology*, 1923.

that he should follow the agricultural occupation of his father, and his scientific education was therefore begun at the engineering school of Apeldoorn in Holland. He entered the Polytechnic School at Zurich several years later. Clausius was at this time teaching physics in this university, and it cannot be doubted that the young student listened with rapt attention to this great teacher who developed the principles of the dissipation of energy and first advanced the mechanical theory of heat production.

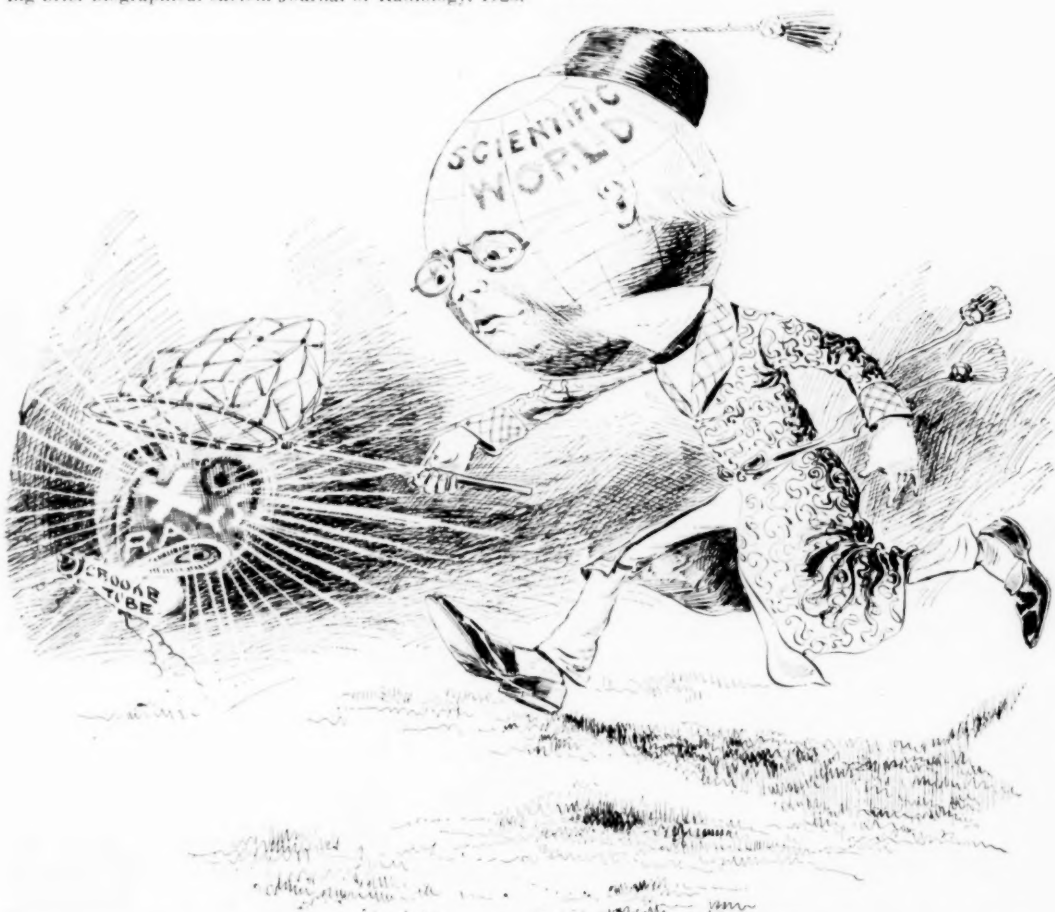


Fig. 2.—Cartoon appearing in one of the Philadelphia newspapers at the time Professor Roentgen

made announcement of the discovery of the x ray.

Roentgen graduated from the university with the degree of Doctor of Philosophy. As a student he manifested an extraordinary aptitude for work requiring exactness in detail, and his industry and ability won him immediately after graduation an assistantship to Kundt, whose favorite pupil he was and with whom he was associated for many years. Roentgen ever held him in highest veneration as his teacher and guide. To him he owed the exactness of his methods, his accuracy of thought and his thoroughness in investigation. When Kundt was called to Wurzburg in 1870 Roentgen went with him and, in 1872, followed him to Strassburg, where he became a private lecturer in physics. In 1875, at the age of thirty years, Roentgen was appointed professor of mathematics and physics in the agricultural academy at Hohenheim, but left the following year, at Kundt's request, to return to Strassburg, where he assumed the position of the associate professor, teaching theoretical physics.

In 1879, however, at the age of thirty-four years, he was called to Giessen as full professor and director of the institute of physics. Here he remained for nine years, until appointed director of the physical institute in the great school of Wurzburg, the second most important university of Bavaria.

It was here that the discovery of the x ray was made. In 1900, after twelve happy, active and useful years of service, and at the special insistence of the government, he accepted the position of director of the Royal Academy of Technical Physics of the

University of Munich, which position he occupied until his death. The presidency of the Royal Physical Institute of Berlin was offered to him, but declined. Honors and titles from all corners of the civilized world have been bestowed upon Roentgen. Immediately upon announcement of the discovery, the Emperor invited him to demonstrate the x rays at the Palace of Potsdam, where he was awarded the Crown Order of the Second Class. The title of Excellence was given him by the German Government and his statue was erected on the Potsdam bridge in Berlin. In 1901 he obtained the Nobel prize for physics, the first of the awards made. The rays he discovered have, by general consent, been named after him. The honors and acclamations of the world never in any way affected the modest, generous and lovable character of the man. Nor can it be said of him that he ever derived any material gain from his important discovery. He gave it to mankind freely and wholly.

#### ROENTGEN'S WORK

Before 1895, his scientific work related to various questions in experimental physics; the examination of the specific heat of gases, the study of isothermal crystals, solar calorimetry, dust figures, aneroid barometry and the absorption of heat by vapor. Since then his efforts have been mostly devoted to electricity and the phenomena of exhaustive tubes.

In the consideration of Roentgen's scientific labors, one characteristic that stands out above all others is the self-restraint shown in his intellectual activities and his

reverence for temperate and accurate deductions. His was the mind of a mathematician and his schooling was one in thoroughness, exactness and precision. Indeed, as a keen, inductive thinker he has had no peer in the modern scientific world. Nowhere in any of his productions is there a hasty conclusion based on insufficient premises, nowhere any unfounded generalization. It is always the careful, painstaking work of an investigator, who constantly denied himself the joys of enthusiasm, per-

sistently repressed his emotionalism and the tendency to glorification in his achievement. The constant self questioning, the constant searching analysis of his own beliefs and observations, indicates a mental asceticism which characterizes the highest type of scientific worker. He permits the facts to speak for him. His experiments, therefore, have an elemental firmness, strength and finality. It is the quality and not the quantity that renders his work of such surpassing value.

(To Be Continued.)

### PHYSIOTHERAPY IN GENERAL PRACTICE\*

L. S. MERRILL, M. D.,  
Ogden, Utah.

SINCE the curtain fell after the final act of the great World War tragedy, certain well-marked tendencies have been noticed in the medical world. During that period laboratory medicine received a tremendous stimulus and has since progressed with unheard of acceleration, so that the older methods of bedside observation are less used than formerly. Another recent tendency is group medicine, with its highly trained specialists. A third outstanding feature is the rebirth and rapid growth of Physiotherapy, especially electrophysiotherapy.

These facts, coupled with the terrifically accelerated growth of scientific knowledge generally, have somewhat disturbed the calm and peaceful sailing of the old-time family doctor. In fact, if the man in gen-

eral practice is to survive, he must have the spirit of research and make his general practice, with its wealth of clinical material, an enormous research laboratory. Having such an aim, coupled with a determination to accept the challenge offered in his daily work, this new type of man should find abundant opportunity for service. This is my only defense in standing before such a body of distinguished veterans in medicine and briefly outlining a few observations of the use of physiotherapy in general practice.

The following propositions are indisputable:

1. By far the major part of a medical student's time is spent in learning diagnosis and a very minor part in learning treatment.

\*Read at the Fourth Annual Meeting of American College of Physical Therapy, Chicago, Oct. 20, 1925.

2. There is an accepted belief that once the diagnosis is made, almost anyone can quickly look up the treatment and administer the same.

3. There is a distinct tendency toward therapeutic nihilism.

4. The various cults in the healing art are flourishing as never before in spite of the great advancements in scientific knowledge; various surveys having shown the embarrassing and shameful fact that about 90 per cent of sick people go to the irregulars for help, while only 10 per cent seek scientific medicine.

5. Physiotherapy, the oldest of all therapies, has been generally shunned by the medical profession and is even today ridiculed by too many well-meaning but poorly informed doctors.

6. Medical schools have lagged behind in the field of physiotherapy, thus leaving its development in the hands of equipment manufacturers and the comparatively few who have seen the light.

Some of these briefly stated propositions present annoying situations to most medical men. To me, as one of the thousands of young men standing just at the edge of this rejuvenated old game of physiotherapy, and with enough evidence culled from the research laboratory of general practice to fire enthusiasm, the solution of these problems looks more hopeful.

Surely everyone will agree that diagnosis is the first essential in our work and that it cannot be neglected without disastrous results. Still, with a correct diagnosis, it is

not uncommon to meet with disappointment in the practical treatment of many cases. If the case is one of the numerous diseases for which we have no specific, then our therapeutic weakness shows up. So, also, we are looking for excuses in the case of the doctor-worn chronic who himself knows more than any one doctor could know about the many medical tricks that have failed to relieve him. Perhaps a careful physical and laboratory diagnosis has classified the case. This may have been checked over by a dozen good doctors; then each in his turn has utilized the usual medical tricks. These failing to relieve, he accepts the proposition of therapeutic nihilism, admits defeat and, true to form, the patient crosses the hall to some irregular. This is the point at which there will always be a certain leak in medical practice, because some of the incurables will be repelled by our honest but discouraging advice and attracted by the blatant promises of the irregulars for payment in advance. Certainly no man can be expected to cure every patient who seeks his services, but just at the point where medical treatment fails a great dam of intelligently applied physiotherapy can be thrown across the swiftly moving stream of discouraged patients and a majority of them cured, while others are at least saved from the whirlpool of dishonest quackery.

Even in the medical school, but particularly after entering practice, one feels the great need of more intensive training in the art and science of treating patients. This does not mean treating symptoms merely. Undoubtedly a therapeutic skepticism is a frame of mind highly to be desired when



we consider the wonderful results promised by that ever-increasing army of high powered detail men.

Perhaps it is this attitude in part that is holding the rank and file of medical men from investigating and using the numerous physiotherapeutic modalities. But this same hedge of therapeutic doubt, even though it surrounds the man of high diagnostic ability, is surely detracting from his power to effect cures and is one of the main arteries of nourishment for the irregulars.

These are some of the considerations that compel an investigation of physiotherapy. My attitude in the beginning ran true to the sentiment which is framed over my desk:

"A wise old owl lived in an oak.

The more he saw the less he spoke.

The less he spoke the more he heard.

Why can't we be like that old bird?"

After three years in the field I am definitely convinced and filled with a hopeful enthusiasm over the possibilities of properly understood and wisely applied physiotherapy.

Usually the patient seeks the doctor because of pain or some other disturbing subjective symptom. The trouble may be some simple, self limited disturbance which calls for no treatment. An explanation of this to the patient does not always satisfy him; but if the symptoms are relieved the patient goes home happy, hopeful, optimistic. This frame of mind is a boomerang and the doctor is at once repaid in the knowledge of satisfactory service rendered.

In a brief paper of this character the aim is to generalize and perhaps point to a few illustrative examples. Physiotherapy is a two-edged weapon. In its ability to promptly relieve symptoms lies the danger to the operator of treating symptoms before making a complete diagnosis. This same danger, however, is inherent in the use of morphine or any other rapidly acting drug.

In the infinite variety of cases that constitute a general office practice it is hard to find a case that cannot be definitely benefited by some form of physiotherapy. Consider the actinic rays: these rays have numerous qualities. They are sedative or stimulating. They are analgesic, antipruritic and antirachitic. They are bacteriocidal and may be made destructive of superficial skin cells. Any one of these various properties may be utilized at will by a careful attention to technique and by using both aircooled and watercooled burners. The usefulness of actinic rays is as indisputable in the field of dermatology as it is in general metabolic disturbances, in gynecology or in eye, ear, nose and throat practice. They have even saved the surgeon some disagreeable cases such as tuberculous adenitis.

Most of a general practice consists of the minor ailments, with just enough of the more spectacular cases to add zest. To the beginner in physiotherapy some of these minor cases often become spectacular in their response to treatment. Thus all the myalgias and neuralgias, the contusions and sprains, the common cold and septic throats, the streptococcic and vincent's infections of tonsils, pyorrhoea, herpes, bronchitis, ery-

sipelas, the infected skin abrasions, almost the entire list of dermatological cases, but more especially the eczemas, impetigos and the birth marks, even the small but painful bunions, all of these and countless others, too numerous to mention, are greatly benefited if not completely cured by means of actinic rays alone.

The actinic ray is just one small item in physiotherapy, but its almost universal adaptability gives it a high standing. Diathermy occupies a similarly elevated position. When we consider the universal and age-old use of heat, by the laity as well as the profession, in relieving pain and treating inflammation, it is hard to understand why the profession, to the last man, would not adopt diathermy. Here we have a method of generating heat in any degree, in any location and for any desired time. To understand the beneficial effects of diathermy it is only necessary to recall all the phases of the inflammatory process. In a broad sense, inflammation is the reaction of living tissue to injury, which is not of such a degree as to cause the immediate death of the tissue. The final analysis of almost every disease will reveal some phase of the inflammatory process. Diathermy properly applied can often be used to speed up the chemical and biological reactions, thus reversing the inflammatory process, saving time and substituting a speedy resolution in the place of a fibrosis and tissue destruction.

The big question in diathermy is the technique of application. This question will always furnish material for argument. As

an example I will mention the technique I have used in treating a very small group of cervical erosions. There were 47 cases, occurring in women who had given birth to from one to six children. The presenting symptoms in all cases were: marked leucorrhoea, indefinite pains through the pelvis and a feeling of lassitude. In no case was fever present and in no case were the adnexa demonstrably involved. Most of them showed an endocervicitis ranging from a very slight external erosion to a disease of the entire endocervical canal. A few cases had a definite endometritis with subinvolution of the uterus. These latter were given medical diathermy through the uterine body as well as the coagulation of the cervix. All cases had a slight cervical laceration and in one case this was an extensive bilateral splitting of the cervix.

The following technique was used: With the patient in the lithotomy position, a block tin electrode six by six inches was placed under the buttocks. A metal bivalve speculum was used to expose the cervix, which was then cleansed with hot water and dried with cotton. No local anesthetic was used. With the Plank tonsil needle the entire eroded area was then coagulated, using a current of about 600 ma. The entire operation takes about three to five minutes and very little pain is experienced. We attempt to destroy all the diseased area so that the depth of penetration varies with the case. The patient is dismissed and told to return in ten days. At that time most of the sloughing has taken place and the cervix presents a bright red, healthy appearance. In most of the cases no other treatment was used at

all. In a few cases, about ten days after the original operation, the cervix was given one treatment with the water cooled actinic burner. In two cases the original treatment was followed, after sloughing, by one application of the galvanic current, using the positive zinc electrode in the cervical canal. In the one case, with extensive bilateral laceration and erosion, it was necessary to repair the laceration two months later; this case, however, demonstrated the value of a preliminary electrocoagulation of diseased tissue, even if a later repair is anticipated. By this preliminary measure the later repair is much less extensive, because the cervix contracts markedly following coagulation of an erosion; also, healing is facilitated because the tissues have been practically sterilized.

It was deemed necessary to rule out pregnancy before the operation of electrocoagulation. This was done in all cases except one, in which a mistake was made. The patient aborted a three months' foetus two months after the operation and we felt that the operation was probably responsible for this. It is now eight months since the first case of the series and one month since the last case. Every case has been examined one month after the operation and all of the earlier ones several months later. The results were: complete cure of the erosion in every case. The average number of office visits necessary in each case was three. In striking contrast to the big, boggy, beefy, bleeding pus-bathed cervix, one sees thirty days after the operation a contracted, firm cervix, covered with a clean, pink mucous

membrane, with a clear, watery, normal mucous discharging from the external os.

The method as outlined has the following advantages over the surgical procedures:

1. No hospitalization, with its expense and loss of time.
2. No anesthesia is needed.
3. In case of a mistaken early malignancy the method is ideal, while surgery is dangerous.
4. The end result shows no scarring or distortion of the cervix and there is no loss of normal tissue.
5. Over the medical treatment the method has the advantages of being much more certain, more permanent and quicker.

Time will not permit a discussion of the galvanic current, the various sine wave currents, static current or x ray. All of these modalities have extensive fields of usefulness. Careful judgment must be exercised in choosing correctly between them. In this brief paper then, I have attempted to show:

1. That a new kind of family doctor is needed and must accept the challenge of his practice as a research laboratory.
2. That there is danger in an attitude of indifference to a field of work resting on a scientific foundation.
3. That an attitude of therapeutic doubt forces patients to the irregulars.
4. That physiotherapy is in no sense a panacea, but must be dovetailed with medicine and surgery.

5. That the general practitioner can advantageously use physiotherapy in a vast majority of his cases.

6. That once the icy indifference of ther-

apeutic nihilism feels the warmth of a physiotherapeutic success, it melts, and in its place springs up an attitude of hope, assurance, confidence and enthusiasm.

## NEW EQUIPMENT

### NEW TYPE OF ILLUMINATION IS DEVELOPED FOR MICROSCOPES\*

GENERAL ELECTRIC COMPANY  
Schenectady, N. Y.

A new method for the illumination of microscopic specimens has been made possible by the use of rods of clear fused quartz. The facts that quartz absorbs a very small portion of the light and has a high melting point make its use in this work advantageous. The light conveyed through a solid quartz rod is sufficiently brilliant to illuminate high power objectives without the additional use of substage condensers. The rod also gives better detail than the ordinary methods of illumination. The ends of the rod are ground uniformly, but not polished. Diffused light thus obtained obviates all trouble from images of the filament. It is also possible to work farther from the light source to avoid heating of specimens.

Miss S. B. Leiter, metallographist in the research laboratory of the General Electric Company, has been obtaining satisfactory results with several types of clear fused quartz illuminators. For use with the ordinary small microscope, a half-inch quartz

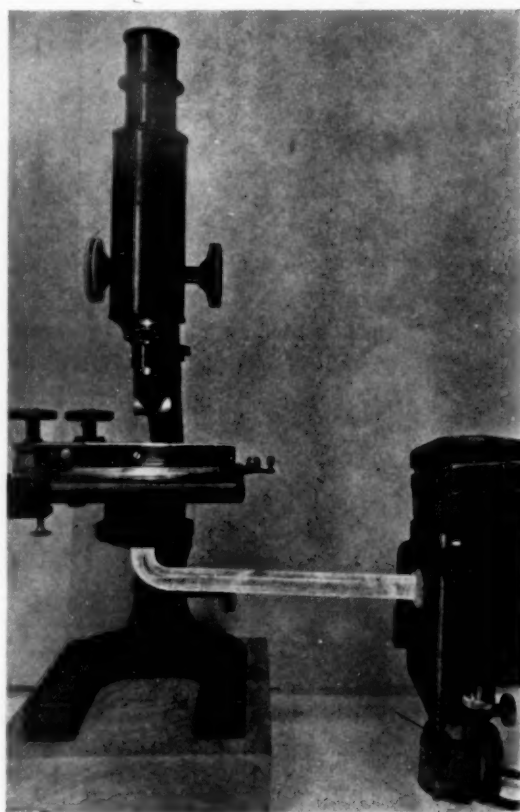


Fig. 1—Arrangement of substage illumination for work with an ordinary small microscope.

rod with a right angle bend is used. The light source is a small moving picture lamp, with the lens removed. The intensity of the light is regulated by a rheostat. There is less loss of intensity than when the light is reflected from a substage mirror, and the light can always be directed to the stage of the microscope where wanted.

In the case of the inverted type of micro-

scope, where illuminating a transparent specimen has presented difficulties, the use of quartz rods is especially convenient. Since intense heat does not shatter quartz, one end of the quartz rod can be placed immediately over an arc, and better illumination conveyed to the specimen.

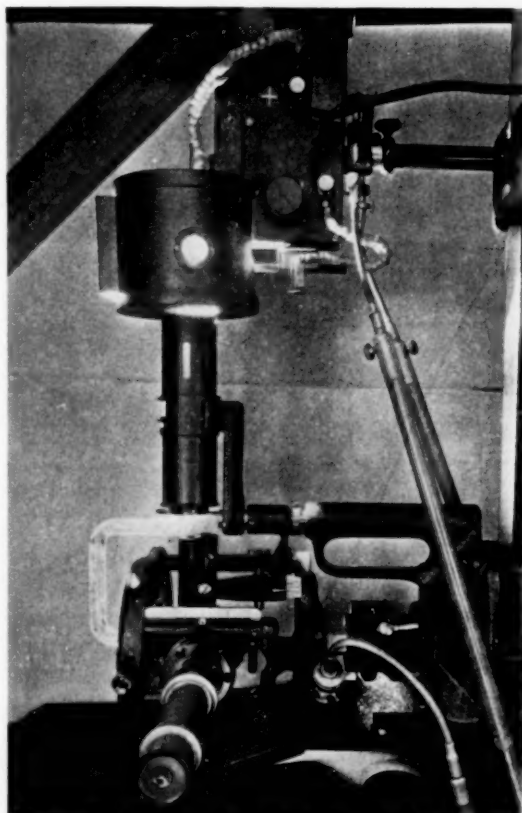


Fig. 2—First method of carrying light from arc to stage of inverted type of large microscope.

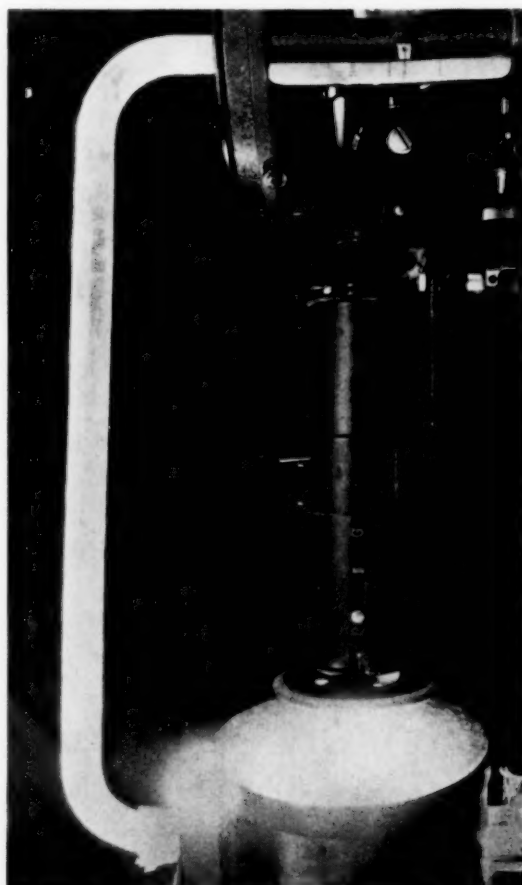


Fig. 3—Second method of carrying light from arc to stage of inverted type of large microscope.



# EDITORIAL

## ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

A Journal of Ideas and Ideals.

A. R. HOLLENDER, M. D., Editor  
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## Clinical Congress —of— Physical Therapy *in conjunction with* The Fifth Annual Meeting



American College  
—of—  
Physical Therapy  
Oct. 18th, 19th, 20th, 21st, 22nd, 1926  
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Chairman Program Committee

## RADIUM AND X RAY IN MALIGNANCY

This is the age of physical therapy. No physician or physicist in the favored audience at Wurzburg hearing Wilhelm Conrad Roentgen announce his discovery of a new form of radiation, December 28th, 1895, could possibly have foretold the future vast scope of application of the new ray, in diagnosis and in therapy. No branch of medicine has equalled the achievements of x radiation in the brief three decades of its known existence. Diagnosis in all medical fields has gained in

precision. This has not been entirely due to the improvement in x ray equipment, but rather to the increasing skill of the trained radiologist. The proper interpretation of the x ray plate is the important factor in securing a diagnosis, although a technically good film facilitates the interpretation.

In therapy the x ray has gradually attained to a supremacy equal to its use in the diagnostic field. It is preeminent in the treatment of uncomplicated uterine fibroids and benign uterine hemorrhage, and has great value in carcinoma of the uterine cervix when combined with its slightly younger sister, radium.

Physical agents more recent than x ray and radium which are yielding excellent results and show future promise are surgical and medical endothermy, and ultra violet radiation. The enthusiasm of the sponsors of these physical adjuvants has led to widespread unjustifiable claims of their therapeutic value, but future limitation will show the real virtue of these methods in their proper fields.

Malignancy in all its varied manifestations is the greatest unsolved problem before the practitioner today. We know much of the microscopical appearance of different types of cancer and of the effects of radiation on cancer cells; but we are still ignorant of the etiology of any malignant growth and of exact prognosis under treatment. Radium and x ray, alone or combined with radical surgery in early cases, have effected cures extending over many years in many types of carcinoma, especially those most accessible to direct treatment;

in advanced, widespread growths radium and x ray offer the only successful method we have at present by which we can alleviate suffering and prolong life.

The future may afford some chemical or medicinal cure for cancer; for the present we must develop our skill in the application of those physical agents which are our only successful weapons.

In perfecting our physical therapy technique, there are two problems demanding solution. Dosage is still in the experimental stage in x ray work, while radium application is on a more secure footing. In radium we have a stable substance easily measurable and constant in amount while in electrical work there are variations in x ray output depending on differences in rectification, degree of pitting of the target, state of exhaustion of the tube, and fluctuations and surges in the current. Radium dosage is more exact and the technique of treatments capable of reproduction so that biological effect may be studied.

X ray dosage, however, is now in process of perfection. Practically all radiologists now employ an ionization method to determine intensity or quantity of the output, and measure the quality by spectrometry or other device to obtain the wave-length or absorption-coefficient. The urgent necessity is standardization of our measuring instruments. At the First International Congress of Radiology, held in London in July, 1925, a resolution was passed to appoint an international committee to promulgate a uniform x ray standard of intensity and an x ray unit. In this country one of

the radiological societies has taken steps to maintain an ionization chamber at the Bureau of Standards in Washington for standardization of all American instruments in electrostatic units.

True estimation of biological effects will follow absolute physical standardization.

The second problem to surmount is the use of our physical agents to the fullest intensity in treating malignancy. Radium is only effective in experienced hands and in massive doses. Too many radiologists are experimenting in cancer work with a few milligrammes of radium; valuable time is lost and the disease spreads when too little radium is available for any real service. The radiologist with insufficient equipment is nearly as futile in his efforts as the vendor of cancer pastes. The future effective campaigns against cancer will be waged in hospitals equipped with large stores of radium handled by specialists, in close collaboration with surgeons. If each state could possess a large central supply of radium under the control of experienced radiologists, our cancer statistics would be undoubtedly improved.

The same tendency is seen in x ray work. The new Coolidge water cooled tube permits heavier depth-dosage and greatly shortened exposures. Highly effective treatment can be administered by careful cross-firing through small portals, yielding a heavy depth-dosage in the growth with minimal damage to the overlying normal tissue, supplemented by the application of radium to the interior of the cancer whenever possible. Personal experience with the water cooled

tube in malignant work aided by heavy radium radiation has convinced me that the best future possibilities lie in this technique.

Cancer therapy is our greatest question today. The perfection and more intense application of our chief physical agents, radium and x ray, in combination with surgery, will make this question a far more hopeful one in the future. Endothermy, radium and x ray are developing rapidly to aid the surgeon in this domain; in the near future the occasional cure will be multiplied, and the prognosis of these desperate cases vastly improved.

Robert E. Fricke, M. D.,  
(Howard A. Kelly Hospital)  
Baltimore, Md.

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#### THE FUTURE OF PHYSIOTHERAPY

Although the fact that the field of physiotherapy has been moving forward in leaps and bounds must be very gratifying to those who have been practicing this division of therapy for many years past, still there creeps into the minds of the thoughtful ones a feeling of apprehension lest this very fact prove to be a boomerang and smite them in their hour of jubilation.

Exorbitant claims are made not only by the manufacturers, but also by the occasional general practitioners who have suddenly blossomed from obscurity to full-fledged specialists in the field of physical therapeutics. Many, too, and alas, are buying ultra violet outfits and high frequency machines, though possessing not the remotest speck of scientific knowledge regarding

its application, nor caring much about it. The ultra violet lamp is steadily finding its place in the beauty shop side by side with the "violet treatments" of a two-by-four high frequency machine, there to soothe the beauty seekers. And yet another salvo to add to the brush heap of disrepute is the increasing number of so-called schools of physical therapy which profess much and deliver little, not unlike the cheap commercial medical school of the past.

The situation has a counterpart in the befuddled condition which existed in the field of drug therapy a quarter of a century or so ago. Then the strong hand of the A. M. A. smote this malignant growth by creating its Council of Pharmacy and Chemistry, the result of which has been so gratifying as to incite a thoughtful Fellow of that organization to apply this same remedy to the present day bewildered and confused state of physical therapeutics.

Those of us who see much good in physical therapy, but who are also keenly appreciative of its limitations, truly welcome the advent of this salutary influence. Would that the various state legislatures could be awakened to a just viewpoint, followed by proper legislation, on the matter of cults which have the educational advantages of the average barber and yet are allowed to treat the sick on a par with the medical man who needs to spend from four to eight years in higher education before he is allowed to prescribe sodium bicarbonate. This type of individual is making rapid strides in ingratiating himself in the good graces of a credulous public. He adds his full force in

creating a barrier of distrust which the honest though conservative physician finds difficult to overcome.

The task of correcting these evils lies principally in the hands of those who practice physical measures with a full appreciation of their virtues as well as their limitations; whose enthusiasm is tempered with judgment. By their example and preachments will the skeptical though honest practitioner be led to partake of this new food.

F. H. EWERHARDT, M. D.  
(Washington University, School of  
Medicine.)



#### GREAT DISCOVERY BY DR. MILLIKAN

NOTED SCIENTIST, OBERLIN GRADUATE, RE-  
PORTS TO NATIONAL ACADEMY FINDING  
NEW ULTRA X RAY.

Discovery of ultra x rays a hundred times more penetrating than ordinary x rays was announced at the Madison meeting of the *National Academy of Science* on November 9, by Dr. R. A. Millikan, '91, formerly of the University of Chicago, and now Director

of the Norman Bridge Institute of Technology, Pasadena, California, as the climax of twenty years of search for the cause of a mysterious radiation. Two physicists, Sir Ernest Rutherford and J. C. McClellan, noticed an unaccountable effect on their electrosopes in 1903 and the Germans tried to determine its cause by high balloon ascensions just before the World War.

Professor Millikan's researches have extended over a decade, during which time he was assisted by I. S. Bowen, Russell Otis and Harvey Cameron.

To account for the ultra x rays, it is necessary to conceive that space is filled with rays of one sort or another traveling in all directions with the speed of light. This, Dr. Millikan says, is "a conception which is almost too powerful a stimulus to the imagination."

So far Dr. Millikan has not proposed a name for the newly described radiations, although some of his colleagues have suggested calling them "Millikan rays" in his honor. He gives them a purely descriptive name, "penetrating rays." Apparently they merit the title, for, according to their discoverer, they will pass through six feet of solid lead before they are extinguished, whereas the "hardest" x rays, up to the present the most penetrating radiations known, are stopped completely by half an inch of lead.

Where the rays come from is an unsolved mystery. They enter the highest atmosphere from the depths of outer space, being born apparently of the disintegration of atoms or of their transmutation into other

elements. Dr. Millikan states that if sufficient energy for the transmutation of elements could be generated the process would bring forth penetrating rays as a by-product. But inasmuch as the immense energy of ten million volts or more would be necessary for this, he does not regard the prospect of human production of penetrating rays to be very promising.

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#### REGINALD G. BLACKALL, M. D.

An early experimenter with the roentgen ray, Reginald G. Blackall became an early sufferer from exposure. After twenty-five years of suffering from dermatitis, Reginald G. Blackall recently died in a London hospital at the age of forty-four. For the sake of science practically his whole life has been one continuous agonizing existence. All his mature years have been depressed with pain and suffering. A co-worker has been quoted in one of our Journals: "I doubt if in the whole list of martyrs to science there could be found a more striking case. He was only forty-four years of age and suffered more than half his life. Although toward the end he endured much agony, he never complained and he retained his enthusiasm for the science of healing, keeping up with its development. With both arms gone, he still worked as an adviser to other experimenters in the same field, when able."

Surely with such devoted scientists leading the onward march of the science of roentgenology, success and righteous recognition is inevitable.

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## RADIOLOGICAL MEETING

CHAMPAIGN, ILL., MAY 18TH

There will be a joint meeting of the Central Illinois Radiological Society and the Chicago Roentgen Society at Champaign, Illinois, on Tuesday, May 18th, during the annual Convention of the Illinois State Medical Society. A splendid program has been arranged and every ethical physician is cordially invited to attend. Program of the meeting can be obtained from Harold Swanberg, M. D., President, Central Illinois Radiological Society, 731 Hampshire St., Quincy, Illinois.

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## RONTGEN SOCIETY

At a recent meeting of the Rontgen Society, March 30, 1926, the Ninth Silvanus Thompson Memorial Lecture was delivered by Sir John Thomson-Walker, F. R. C. S., in the Barnes Hall, Royal Society of Medicine, Cavendish Square. The subject, *Radiology in Urinary Surgery*, was given remarkable reception.

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## OTORHINOLARYNGOLOGY

The American Otological Society, the American Laryngological Association, the American Laryngological, Rhinological and

Otological Society and the American Bronchoscopic Society cordially invite members of the *American College of Physical Therapy* to attend their annual meetings to be held at the Mount Royal Hotel, Montreal, Canada, May 29th to June 5th, 1926, inclusive, and to take part in the discussion of the papers to be presented.

Correspond with Robert L. Loughran, M. D., Secretary Am. L. R. & O. Society, 145 West 58th St., New York, N. Y.

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## UNITED STATES CIVIL SERVICE EXAMINATION FOR HEAD NURSE

Receipt of applications for head nurse will close May 11. The examination is to fill a vacancy at Freedmen's Hospital, Washington, D. C., at \$1,140 a year, plus room, board and laundry, and vacancies occurring in positions requiring similar qualifications.

Applicants must have been graduated from a standard four years' high school course, and from a recognized school of nursing requiring a residence of at least three years in a hospital having a daily average of fifty patients or more giving a thorough practical and theoretical training; also they must show evidence of state registration, and must have had one year's hospital experience as a graduate nurse.

# THE STUDENT'S LIBRARY

## BOOKS RECEIVED

This column is devoted to acknowledgment of the books received. Such acknowledgment must be regarded by the sender as sufficient recognition of the courtesy until time and space permit selections to be made for review.

**FUNDAMENTAL CONCEPTS OF PHYSICS.** In the light of modern discovery. By *Paul R. Heyl*, Ph.D., Physicist, Bureau of Standards, Washington. Cloth. Pp. 112, with 3 figures. Baltimore: William & Wilkins Co., 1926.

**THE NEWER KNOWLEDGE OF NUTRITION.** The use of foods for the preservation of vitality and health. Third edition. By *E. C. McCollum*, Ph.D., Sc.D., Prof. Chemical Hygiene, Johns Hopkins University, and *Nina Simmonds*, Sc.D. (Hygiene), Associate in Chemical Hygiene, Johns Hopkins University. Cloth. Pp. 675, with 28 figures, 34 tables and 21 charts. New York: Macmillan Co., 1925.

**GYNECOLOGIC UROLOGY.** By *Lynn Lyle Fulkerson*, A. B., M. D., F. A. C. S., Asst. Prof.

Gynecology, New York Post Graduate Medical School; Instructor in Obstetrics and Gynecology, Cornell University Medical School, etc. Cloth. Price \$6.00. Pp. 247, with 166 illustrations, including 86 original and 14 color plates. Philadelphia: P. Blakiston's Son & Co., 1925.

**INTERNATIONAL CLINICS.** A quarterly of illustrated clinical lectures and especially prepared original articles. Vol. 1, Thirty-sixth series. Edited by *Henry W. Cattell*, A. M., M. D., with the collaboration of *Chas. H. Mayo*, M. D. Philadelphia: J. B. Lippincott Co., 1926.

**KIDNEY DISEASES AND HIGH BLOOD PRESSURE.** Practical manual for physicians and patients. Part 1. By *Frederick M. Allen*, M. D., Morristown, N. J., the Physiatric Institute. Cloth.

## BOOKS REVIEWED

**BONE SARCOMA.** An interpretation of the nomenclature used by the Committee on the Registry of Bone Sarcoma of the American College of Surgeons. By *E. A. Codman*, M. D., Registrar. Cloth. Price \$2.00. Pp. 93, with 24 illustrations. New York: Paul B. Hoeber, Inc., 1925.

The author in this little text outlines the object of the Registry of Bone Sarcoma as being the production of uniform classification, so that roentgenologists, clinicians and pathologists can have a mutual understanding of the clinical entities which are referred to. Toward this end, Drs. Ewing, Bloodgood and Codman of the Amer-

ican College of Surgeons combined forces with Drs. MacCarty, Sondern, St. George and Bell, representing the Clinical Pathological Association.

Formerly terms employed by one man might differ tremendously from the same term used by another. To others, these terms might portray no meaning. For the standardization of these terms and classifications, this committee have worked.

The classification which has resulted through their combined work consists of eight groups of

cases, covering all bone tumors: 1, metastatic tumors; 2, periosteal fibrosarcoma; 3, osteogenic tumors (benign and malignant); 4, inflammatory lesions of bone; 5, benign giant cell tumors; 6, angioma (benign and malignant); 7, Ewing's tumor; 8, Myeloma.

To clarify this classification, the clinical, roentgenological and gross pathological features of each type are described and examples are given. Such a text represents an effort which has been long felt by the medical profession. The standardization of tumors has been a question of much dispute. Cooperation of the clinicians, roentgenologists and pathologists, as requested by Codman, will do much toward furthering our knowledge concerning this subject.

**HIGH FREQUENCY PRACTICE.** Fourth Edition. By *Burton Baker Grover*. M. D. Cloth. Price \$6.00. Pp. 555, with 73 illustrations. Kansas City: Electron Press, 1925.

The empiric polypharmacy, with its shotgun prescriptions and empiric formulas, has become history. Modern clinicians base their therapy on the alleviation of the etiologic pathology and restoration of the normal physiology. Toward this end the therapy indicated is to be used, be it drugs, surgery, diet, light, radium, roentgen rays or electricity. For the correct application of these measures, their physiological properties must be clearly understood.

The author, an able writer and teacher, presents his subject with these points in view—the alleviation of the etiologic pathology and restoration of normal physiology. Assuming that the reader knows little or nothing pertaining to electricity and its medical applications, the author begins with the very elementary principles and establishes his foundation. After discussing the fundamental principles underlying an understanding of electricity, magnetism is explained. To these are added discussions on the physics of the high frequency currents, medical and surgical diathermy. A commendable hobby of the

authors is the discussion of blood pressure. A valuable presentation is given.

Having established the minimal knowledge of the principles which signify the physiological indications and control the intelligent application of these physical measures, the author considers the diseases which affect the human organism by systems. Under each system the disease to which high frequency is applicable is discussed and the technique of application presented.

It is the message of the writer to have first a knowledge of the laws and workings governing the physiological functions of the various organs which constitute the human body; second, an understanding of the limitations and indications of the measure in which he is most proficient and, third, the application of these measures when indicated to meet these altered physiological functions. If we practice medicine in this light, physical measures will soon receive their just recognition.

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**ALLERGY, ASTHMA, HAY FEVER, URTICARIA AND ALLIED MANIFESTATIONS OF REACTION.** By *William W. Duke*, Ph.B., M. D. Cloth. Price \$5.50. Pp. 302, with 75 illustrations. St. Louis: C. V. Mosby, 1925.

Reactions classed as allergy include a multitude of conditions about which the majority in the medical profession are ignorant. The subject has only been scratched and the opportunity for study is unlimited.

Dr. Duke in this monograph offers a clinical presentation of the subject of allergy, drawn from a period of twelve years of practical clinical study. His observations presented in this text are based upon data obtained from careful detailed routine study of over 500 individual cases. The experimental material he acknowledges as liberally borrowing from other writers especially versed on this phase of the problem.

After a thorough presentation of the experimental anaphylaxis, serum sickness, bacterial allergy and illness in humans traceable to specific hypersensitiveness to material agents, a botanic survey of the pollinating plants of Kansas City is given as typical for most districts. A pictorial presentation of these plants is included. Hypersensitiveness to pollen of vegetable and animal origin, to smoke, dust, food, drugs, bacteria, insects and parasites is discussed with case-history presentation. Therapeutic sera, transfusion and even endogenous causes, as weaning a baby, the author includes as causative factors. Contributory causes to the reaction include many of the physical and physiological measures, together with some pathological conditions.

The general characteristics of reaction, as recognition, type, time, duration, periodicity, etc., are enumerated along with the symptoms of the allergy. We are surprised to find the variation in types of symptoms that are included by the writer in this discussion.

Specific diagnosis is considered in detail. The technique and interpretation of skin tests are given, together with picturesque illustrations. Group tests are recommended by the author. Ophthalmic, nasal, inhalation and subcutaneous injections are evaluated.

The results of Dr. Duke's therapeutic experience are given in a discussion considering five main points: avoidance or removal of the specific cause of illness, avoidance or removal of contributory causes, specific protein treatment, nonspecific protein treatment, and symptomatic treatment.

In the second division of this monograph, the reactions caused specifically by the action of physical agents are considered. The author regards such reactions as asthma, urticaria, etc., as being caused in some instances by the action of physical agents as light, heat, cold, mechanical irritation, freezing, burns and in the case

of heat sensitiveness indirectly by the effect of mental or physical effort. Using such a classification a multitude of conditions must be included under the term allergy.

This volume gives as complete a presentation as any the reviewer has yet seen. The clinical presentation of the subject will acquaint the readers with the latest practical advances that have been in this field; but one must not overlook the fact in his enthusiastic study that the symptoms described may be the result of other reactions other than allergy.

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THE ART AND PRACTICE OF MEDICAL WRITING. By *George H. Simmons*, M. D., Editor and General Manager Emeritus, American Medical Association, and *Morris Fishbein*, M. D., Editor, Journal of the American Medical Association. Card. Pp. 163. Chicago: Press A. M. A., 1925.

There is no science in the entire medical curriculum on which the majority of physicians have spent less time and in which they are less proficient than the art and practice of medical writing. The writing and publication of articles on medical subjects play a large and important role in the making of a successful physician. "It is by means of these that he becomes known outside his own community. Through the reading of papers before a society, he makes himself and his work known to hundreds; through his publications, to thousands."

In the successful presentation of a medical paper, the author should have a thorough understanding of the subject under discussion, a definite, clear-cut line of attack and a sufficient knowledge of the English language to enable him to express his ideas in an intelligible and grammatical manner. The majority of physicians either have not the ability or are too careless to do this. Could the reader only see some of the

material that is presented to the editorial office for publication, he would understand the contentions of the authors.

This text presents a well-founded and important criticism. Every physician should equip himself and study the criticisms emphasized by the greatest editors of medical literature.

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**THE NORMAL DIET.** By *W. D. Sansum*, M. D., Director of the Potter Metabolic Clinic, Santa Barbara Cottage Hospital, Santa Barbara, Calif. Cloth. Pp. 72, illustrated. St. Louis: C. V. Mosby, 1925.

As the subtitle indicates, this little manual is a simple statement of the fundamental principles of diet for the mutual use of physicians and patients. It has for its subject matter lectures which have repeatedly been given patients suffering from the various nutritional disorders. A simple presentation of the fundamental principles underlying the selection of a normal diet will often result if followed in the correction of the more common diet errors and prevent the production of many minor and some serious ailments. The presentation of an intelligible, working knowledge of the dietary principles to patients is not the easiest task for most physicians. This little treatise will be welcomed by the profession.

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**COLDS: CAUSE, TREATMENT AND PREVENTION.** By *Russell L. Cecil*, M. D., Asst. Prof. of Clin. Medicine, Cornell University Medical College. Cloth. Pp. 111. New York: D. Appleton & Co., 1925.

In this book the author presents to the layman an elementary discussion on the cause, treatment and prevention of colds. After briefly explaining the structure and function of the nose and throat, he classifies colds, discusses hay fever

and asthma, and considers diseases of the tonsils and adenoids, noting particularly the necessity of their removal in the chronic stage. The treatment and prevention of pneumonia is given, after considering the subject of grip and influenza.

In this little text, the layman is given a clearer understanding of the predisposing and exciting causes of colds and their related conditions, together with a knowledge on how to intelligently handle them when they develop and to prevent their occurrence.

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**WHO'S WHO IN AMERICAN MEDICINE,** 1925. Edited by *Loyd Thompson*, M. D., F. A. C. P., and *Winfield Scott Downs*. Price \$10.00. Pp. 1,820. New York: Who's Who Publications, Inc., 799 Broadway, N. Y.

In this directory, the publishers have attempted to follow as closely as possible other "Who's Who" publications. In the first seventeen hundred pages biographic material is presented on those who are supposed to be the outstanding members of the medical profession. On the whole, the names included and the material presented is to be commended, but the names of many recognized and great men are conspicuous by their absence, while the names of many unheard-of and unrecognized personages encumber valuable space. The same criticism may be made of the hospital directory. The publishers explain this deficiency on the failure on the part of the members of the profession to supply the data when requested. "We have asked and now seek the cooperation of the profession towards the inclusion of any outstanding physicians and surgeons whose names are missing from the following pages." The reviewer appreciates the task that the publishers have undertaken and realize their shortcomings. On the whole, the book has presented an abundance of valuable information and should receive the cooperation of the entire profession.



# INTERNATIONAL ABSTRACTS

## THE SURGICAL POINT OF VIEW: A SYMPOSIUM

**Ray Therapy Versus Surgical Methods.**  
**Prof. Luigi Arnone. Dental Cosmos,**  
**67:255-258, March, 1925.**

The author, after spending a long professional career in the practice of dentistry, with a specialization in the treatment of diseases of the mouth, and regarding a suppurative focus in the alveoli as a lesion which could only be cured by surgical intervention, has in recent resorted almost exclusively to ray therapy as the therapeutic measure to be employed. Let him refer to this change in his own words: "Of late years, however, there has been such an advance in the efficacy of treatment by rays, such a development in the handling of radioactive energies for therapeutic purposes, that I have had to modify my views almost entirely. . . . Alveolar and periodontal suppurations can be and are cured without surgical intervention, solely by the action of the rays of the spectrum."

**Value of Diathermy to the General Surgeon.** **H. W. E. Walther, M. D., and C. L. Peacock, M. D., New Orleans M. & S. J., 77:460-464, May, 1925.**

It is indeed necessary that one should have some working knowledge of electricity before electrotherapy can be administered efficiently. High frequency may mean one thing to a physician and another thing to an electrician. The former may speak of high frequency as 500 interruptions per second, while the latter will not consider anything under 30,000, and usually thinking of 100,000 to 800,000.

Among the conditions amenable to medical diathermy should be mentioned: pelvic and abdominal adhesions, nephralgia, chronic salpin-

gitis, chronic cholecystitis, various forms of fibrosis, arthritis, sacro-iliac arthralgia, loss of function of muscles due to disuse, certain types of dysmenorrhea, sprains and injuries with acute swelling, neuralgia, myalgia, epididymitis and prostatitis. Emphasis is placed on the satisfactory results attained in epididymitis, arthritis, endocervicitis and dysmenorrhea.

Among the conditions which have been successfully treated by surgical diathermy, the author mentions: superficial warts, moles and other skin tumors, including epitheliomata, carbuncles of the female urethra, papilloma of urethra and bladder, chancroidal infections, ulcers, abscesses, para- and peri-urethral gland infections, endocervicitis, Bartholinitis, skenitis, etc.

Medical diathermy is evaluated as a pain reliever alone, and cannot be overestimated as a link in our therapeutic chain. Its possibilities in the management of inflammation and fibrosis are not yet sufficiently appreciated by the medical profession.

Surgical diathermy offers to the general surgeon a valuable adjunct in the treatment of many surgical conditions refractive to the usual means of treatment heretofore employed.

**Diathermy in Medicine and Surgery.** **Disraeli Kobak, M. D., Illinois M. J., 47: 276-284, April, 1925.**

After a historical sketch of the development of diathermy, the author enters into a discussion of the physics and physiologic effects of the high frequency currents. A summation of this elementary explanation of the physics of the high frequency current should interest the reader.

When an ordinary low frequency current of 110 to 220 volts, alternating type, is connected to an iron core that contains opposite insulated wiring, this secondary wiring being numerically in excess of the primary, an induced electromagnetic field occurs, and the current is then stepped up to an enormous voltage. This is called the primary transformer, and although it carries a much higher voltage, the frequency and oscillations are the same. A current of this type, says the author, would traumatize muscles and nerves, fracture bones and endanger life. To overcome this danger the frequency of the oscillations must be greatly increased. The wires of the secondary winding are formed into a circuit that includes a spark gap, Leyden jar condensers, and the primary of a secondary coil of wires known as the d'Arsonval, Tesla or Oudin current. "The spark gap and the condensers and the condensers act in the capacity of storage and a frequency step-up by virtue of its limited holding capacity, perforce must discharge its contents into conductors or wires of lower resistance. The coil of wires is the true d'Arsonval circuit from which the current from which the condensers flow to and from the spark gap, while the resistance or damping effect met at the spark gap, again fills the empty condensers. The product of this activity of the filling and emptying of the condensers, and the resistance encountered at the spark gap, is the establishment of an oscillating alternating current of a frequency of about  $1.2\frac{1}{2}$  million oscillations per second. Through these steps we sacrifice voltage or pressure in order to create high oscillating frequencies, which produce amperage or heat without pain or trauma. If the Tesla or Oudin current is to be used, a third step is necessary, and that is to raise the voltage a second time; although the frequency is not changed, the amperage in order to satisfy the law of energetics, goes down as the voltage goes up. A d'Arsonval current maintains high amperage or heat, and relatively low voltage, and the Tesla-Oudin current maintains high voltage and comparatively low amperage, or heat."

The physiologic effect of diathermy is the production of heat which is endogenous in character and variable in intensity according to the size of the active electrode. It is because of this internal concentration of heat that the author agrees with Wyeth in proclaiming the term "endothermy" as a better explanation of the activity of the high frequency current.

The application of diathermy is the part which is of immediate interest to the practitioner. Medical diathermy has been applied successfully by the author in conditions of high blood pressure and metabolic disturbances, inflammation and degeneration of the muscles, injuries of the joints, sprains and strains, in traumatic and gonococcal arthritis. Surgical diathermy is used in proctology for the treatment of fissures, ulcers, hemorrhoids, etc., also in the removal of benign conditions such as papillomas, fibromas, lipomas, sebaceous cysts, simple and pigmented moles, nevi, tattoo and powder marks, angiomas, chancroids of the fulminating type, tuberculous and other ulcers, leukoplakia, cervical erosions, chondromas, exostosis, pterygium, etc., in accessible malignancies, and in surgical application where a good cosmetic effect is desired.

In conclusion, the author states: "I may be permitted to say that diathermy is not a panacea for all human ills, but a scientific remedy which is highly effective in the affections mentioned, and possibly in many others, which lack of time and space forbid mentioning. . . . Familiarity with the technique is essential. Given an exact diagnosis and proper establishment of therapeutic indications, diathermy will prove a reliable and effective addition to our armamentarium."

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**Radio-Frequency Electricity in Surgery.**  
**Nelson H. Lowry, M. D., Illinois M. J.,**  
**47:383-386, May, 1925.**

In this paper the writer does not attempt in any way to discredit the time-honored surgical knife and scissors, but calls the attention of the

reader to the use and advantages of the electric cautery.

The apparatus required consists of a miniature broadcasting station, made up of a series of transformers and two 50-watt transmitting tubes. This device generates a radio-frequency current of very high oscillation rate, about 3,000,000 a second, and very low amperage and voltage, so as to eliminate burning of the tissue. If the ground wire be attached to the patient and the antennae wire to the knife, the device is ready for use.

The knife or electrode resembles an eversharp pencil, the pencil part made up of insulation and the tip or lead being used to concentrate the electrical energy into a single point. If the point is slowly drawn over the tissues, a rapid separation is effected, as though they were cut with a knife. Preceding the separation is a wall of dehydration. This shriveling or dehydration effect on the tissues before separation occurs is a great protection against the spread of infection, and the metastases of malignant cells.

"For over a year we have been using an experimental model of our own make, and have performed over 100 operations in different parts of the body with a primary union in all but five cases. The time required for the primary union is about the same as for union following knife dissection."

**The Use of Radium From a Surgical Standpoint.** Paul A. White, B. S., M. D., M. S., J. Iowa State M. S., 15:202-206, April, 1925.

In centers where extensive work is done with radium, as in the Memorial Hospital in New York, the greatest satisfaction and efficiency as well as better results have been obtained by close cooperation between the surgeon and radium and x ray therapists.

It is postulated by the writer that surgical removal is the quickest, surest way to rid the body permanently of offending localized pathological lesions.

As the public heeds cancer propaganda and diagnostic acumen is quickened more and more cases will fall into the surgical class.

Radium and x ray are powerful agents and have demonstrated their lethal qualities to cancer cells. They are useful as preoperative measures, and as postoperative assurance of permanency of cure. Evidence seems to be lacking that early circumscribed growths may as safely be left to radiation alone as to the combined forces of surgery and radiation.

"Is it not best to hold to a surgical viewpoint and consider in each case whether removal of the growth with preliminary or subsequent radiation or both may not be better than trusting to a single agent so new in the therapeutic field as radiation?" asks the writer by way of conclusion.

## CUTANEOUS SYSTEM

### TUMORS

**The Treatment of Tumors of the Skin.** Arthur Burbows, M. D., Brit. J. Radiol., 30:304-321, Aug., 1925.

Of 470 rodent ulcers treated by radium 303, or 73 per cent, remain well. Fortunately the majority of rodent ulcers treated were small in area. Of the 303 cases cured, 228 were treated

by 3 or less superficial applications and cured, nothing else being used; but at the same time the need of more than 3 superficial treatments does not necessarily mean failure, although the prospect is less hopeful. Of these 228, 20 have remained well for nine years, 17 for eight years, 17 for seven years, 23 for six years, 37 for five years, 28 for four years, 43 for three years and 43 for two years. In the 303 cases, 11 invaded

the bone and cartilage. They failed to respond to radium, but were cured by diathermy, and 11 more healed up subsequently recurred, but were eventually cured by continuing radium treatment.

Lesions occurring at the upper end of the nasolabial fold are the most deceptive from the point of view of recurrence. If a high standard is maintained in judging the immediate results of the treatment of rodent ulcers the percentage of recurrence is low. Permanent recurrences amount to about  $2\frac{1}{2}$  per cent, and the total number which came back after apparent cure 5 per cent.

The total number of epithelioma of the skin treated was 147. Of these 26, or 18 per cent, had or developed secondary deposits. Of these 147 cases 76 were apparently cured, approximately 52 per cent of all cases treated. The basis of treatment in this condition is the same as that for rodent ulcers so far as local applications are concerned, but more attention has to be given to deep irradiation over the adjacent lymphatic areas and if secondary glands are present radium tubes may be buried in them. In these secondary glands, a fair chance of removing them individually is had by burying in them tubes of a strength of 10 to 15 millicuries, screened by three-tenths of a millimeter of brass for twelve to twenty-four hours. Two or three tubes can advantageously be buried in an oval glandular mass about two or three centimeters long. This method may be combined with deep x ray therapy if the tubes can be implanted well inside the malignant tissue. Fifty or sixty per cent of an erythema dose of x rays can be given at the time the radium tubes are applied, or an 80 to 90 per cent dose six weeks later. Another method that has been showing signs of success has been the burying of emanation tubes each of a strength of 8 or 9 millicuries screened by 1 millimeter of brass, the tubes being left in position for forty-eight hours. The reaction is slight.

Epithelioma on lupus vulgaris is one of the most difficult and intractable conditions to treat, and although it is possible to cure some of the early cases by radium, on the whole it has been a most unsatisfactory condition to deal with. The lesions are either coagulated locally or excised by diathermy. Radium tubes could be applied at any doubtful spot where it was felt to be unwise to go too far with the electrocoagulation. If radium is used in combination, healing may be slightly but not much delayed. It usually takes from two to four months for the lesion to heal over, but almost from the first the pain, which is most distressing in lupus vulgaris, is stopped.

Warts and papillomata are of many different types and vary a great deal in different people under different circumstances. Simple, flat warts usually respond to five milligrams of radium element supplied to one square centimeter, with only a thin sheet of rubber intervening, applied for one-half to one hour. Large raised warts require only a 15 per cent salicylic acid in colloidion once daily for three successive days, or electrolysis. For multiple warts diathermy is most satisfactory, while with senile warts the radium is again recommended applied in a slightly larger dose.

Unpigmented moles may be removed by excision, cautery or diathermy, radium is of no value. On the other hand, pigmented moles may be treated by radium, a sitting of one-half to one hour of superficial unscreened radium every six weeks for a few applications being all that is necessary. This is afterwards changed to the treatment which employs a screen of a tenth of a millimeter of lead and half strength radium plates. Exposures of two to four hours are given at the same six weekly intervals.

Keloids treated by unscreened applications of radium, according to the writer, produce telangiectases. The routine treatments usually adopt-

ed are the application of radium plates to the surface of the lesion of the usual strength of two and five-tenths to five milligrams of element to the square centimeter, screened by one-tenth of a millimeter of lead or a millimeter of silver. The full dose of five hours and fifteen hours, respectively, should not be given. About half the dose is sufficient, given every six weeks or thereabouts.

For capillary nevi unscreened radium plates of a strength of one and twenty-five hundredths to two and five-tenths milligrams of element to the square centimeter are used. They are applied directly to the lesion and merely protected by being covered with thin rubber sheeting. In the case of babies it is best to start only with a dose of ten minutes to a quarter of an hour. In adults doses even as high as one hour may be tolerated without permanent damage resulting, but on the whole thirty to forty minutes is safer. It is well to limit this unscreened treatment to three doses. After the three superficial treatments, a small plate screened by one-tenth of a milligram of lead may be employed, doses of half to three hours being given with the usual six weeks' interval between. It is best to start with the one hour dose, gradually working upwards. In the cavernous nevi the unscreened treatment is omitted as unnecessary. The treatment is carried out as given above with the one-tenth of a millimeter of lead technique.

## HEAT

**A Summary of the Effects of External Heat Upon the Human Body.** Ralph Pemberton, M. D., *Am. J. Med. Sci.*, 169: 485-489, April, 1925.

There are definite indications for the application of external heat in many of our most common conditions. The results of this application should be familiar to those who use it in order to correctly apply and benefit by its use. Exposure of the body to the therapeutic applications of external heat results in a heightened blood flow, an increased metabolism and in the elimination of acids, chiefly carbon dioxide, which escapes through the lungs, urine and sweat in the order of magnitude named. This leaves an excess of alkali in the blood, which then changes its reaction, becoming more alkaline. In the compensatory effort to meet this situation, the excess of alkali is eliminated through the sweat and urine. The profound nature of the changes induced by these measures is clearly indicated, and explanation is afforded of some of the baneful consequences which follow their uncritical use. If carried to extremes tetany may result. The available evidence indicates that part of the benefit of the sweat process in some form of nephritis is due to the loss of acid substances from the body, with consequent benefit to the acidosis frequently accompanying renal disease.

## GENITO-URINARY SYSTEM

### PYELOGRAPHY

**Pyelographic Media.** Roger Colgate Graves, M. D., *J. Urology*, 14:571-578, December, 1925.

In pyelography the selection of the medium has been a much disputed question. In 1918 Cameron proposed sodium iodid as the medium of choice in urography, demonstrating that the

relative density of the x ray shadow of the iodid solution increases with increasing penetration of the x rays, while that of the bromide or thorium solutions, formerly used, grows less. A 13.5 per cent solution of sodium iodid gives as dense a shadow as 25 per cent sodium bromid.

Clinical experience and laboratory facts demonstrate that a 12 per cent sodium iodid is the



pyelographic medium of choice. It lacks but one important quality, that of germicidal activity. Such a quality is important. Mercuric iodid is an antiseptic of high potency, which can be combined in great dilution with 12 per cent sodium iodid without destroying its bactericidal value; and the solution as a pyelographic medium remains essentially unchanged so far as its physical characteristics are concerned. Furthermore, the mercuric iodid is a stable compound, and it is cheaply and easily prepared.

A dilution of 1:3000 mercuric iodid in 12 per cent sodium iodid (1 gram of mercuric iodid in 3,000 grams of 12 per cent sodium iodid) has a bactericidal activity equivalent to 3 or 4 per cent carbolic acid, readily combines with the sodium iodid salt and fulfills the quality that it lacks—a positive bactericidal activity.

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**Pyelographic Errors in the Diagnosis of Renal Neoplasms.** Daniel N. Eisen-drath, M. D., and Irvin S. Koll, M. D., *J. Urology*, 14:615-629, December, 1925.

The variety of normal pyelogram which is most easily confused with that showing the changes hitherto considered as characteristic of neoplasm is that in which there is a relatively small pelvis and multiple minor calyces, which seem to arise without any intermediary major ones. Other points to be borne in mind are (1) that there is much difference, according to the degree of filling, in appearance of normal pyelograms, especially so far as the calyces are concerned; (2) that renal torsion is not as rare as generally supposed; and (3) that pressure from without may produce marked changes in the normal pyelogram.

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**Renal Tuberculosis.** John G. Cheetham, M. D., *Medical Sentinel*, 34:19-27, January, 1926.

In the diagnosis of renal tuberculosis the x ray, both plain and for pyelographic work,

must be carefully used. Statistical evidence shows that the plain x ray presents findings of tuberculosis in about 20 per cent of patients upon whom the diagnosis is confirmed. Differentiation is to be made of the shadow cast by calcification caused by renal tuberculosis and a stone. The tuberculous shadow is usually of lesser density than that thrown by a stone and it has a greater tendency toward an irregular and indefinite outline. A kidney functional test, urinalysis, ureteral catheterization, ureterography and pyelography are other methods used in establishing the diagnosis.

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### URETEROGRAPHY

**Urographic Studies of the Ureters.** W. E. Lower, M. D., and G. W. Belcher, M. D., *J. Urology*, 14:593-614, December, 1925.

Ureterography, according to the writers, is the most efficient method for the diagnosis of pathological conditions of the ureters. If proper care be taken, their belief is that ureterograms can be made a routine measure with a minimum amount of discomfort to the patient. And in their interpretation, if a careful correlation of the clinical symptoms is done, the diagnosis is not difficult.

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### ROENTGENOGRAPHY

**The Diagnosis of Urinary Stone and Hydro-nephrosis.** J. T. Tait, M. D., M. S., *Med. J. Australia*, 1:418-421, April 25, 1925.

In the diagnosis of conditions of the bladder, such as growth, diverticulum and stone, the cystoscope is of the greatest value. Any of the cystitis symptoms that call for a roentgenographic examination of the bladder region should immediately necessitate a cystoscopic examination because of the inability of the roentgenogram to reveal all calculi, demonstrate their lo-

cation or determine the type or availability of intravesicular ulcers or growths.

In the upper part of the urinary tract the services of the radiologist are of the greatest value. A shadow found in a skiagram of the renal and ureteral areas frequently needs further investigation before an absolute opinion can be given regarding its significance; in other conditions, of which hypernephrosis is an example, the data obtainable by the injection of solutions opaque to x rays may often be the only ones on which an accurate diagnosis can be used.

### ROENTGEN INTERPRETATION

#### **Errors in the Interpretation of Urographic Findings. William F. Braasch, M. D., J. Urology, 14:631-651, December, 1925.**

The present widespread employment of urography as an aid in the diagnosis of surgical conditions affecting the urinary tract merits careful consideration of its limitations. A correct interpretation of a pyelogram is based upon a familiarity with the variations in the outline of normal pelves. Normal pelvic outlines have many variations, the least suspected being: (1) Elongation of one or more calyces is often observed in the normal kidney, highly suggestive of neoplasm. The outlines of the minor calyces are regular in contrast to the marked deformity noted in neoplasm. (2) Abbreviation or absence of a calyx simulating pathologic obliteration of the calyx may also be observed, together with (3) pelves and calices of unusual size—large or small.

Incomplete filling of the pelvis and calyces is a frequent source of error in interpretation, producing an apparent deformity simulating neoplasm or hydronephrosis.

Another factor which should be considered in interpretation is the effect of previous operation. Postoperative deformity, such as results from the

removal of stones, fixation of a kidney, drainage and exploration, is frequently quite confusing.

Correct interpretation of the outline of the ureter is particularly difficult. It has been shown that actual stricture of the ureter is more common than previously supposed. The conception that it is often the cause of obscure abdominal pain and of various renal lesions is not borne out by pathologic, urographic and clinical evidence. Stricture causes definite dilatation of the ureter.

Another element not generally recognized is the spasticity of the ureter.

The importance of an anomalous position and relationship between pelvis and calyces as the result of rotation or torsion is not generally appreciated. The unusual medial position of the pelvis, the median axis of one or more calyces, or the lateral insertion of the ureter should be regarded as suggestive of congenital anomaly.

### MENORRHAGIA

#### **The Treatment of Menorrhagia by Radium. Rupert Magaret, M. B., B. S., Med. J. Australia, 1:334-336, April 4, 1925.**

There are four clinical types of menorrhagia: 1, the young, unmarried girl without pathological conditions in her pelvis; 2, the middle aged woman with no pelvic abnormality but with a high blood pressure (uterine insufficiency); 3, the multipara at or about the menopause with a uniformly enlarged uterus (gland hypertrophy); and 4, patients with a cardiac or other abnormality contraindicating major surgery. All patients that have been treated with radium by the writer fall under these headings. And the conclusions that he draws from observations made on these cases are:

1. That it is easy to produce an artificial menopause when desirable.
2. That the risk of producing malignant disease by radium is negligible.

3. That a certain amount of judgment and of discretion as to dosage is necessary in the treatment of the younger type of patient, lest one should produce oligo-menorrhoea. The post-treatment behavior of the first patient cited in the discussion gave the writer considerable anxiety for the first three months and since then he has reduced the dosage in all cases. Up to date no untoward results have been manifested.

4. That the risk to sterility is, to say the least, unproven.

### PROSTATIC CARCINOMA

**A Technique for Handling Prostatic Carcinoma. Ernest M. Watson and Charles C. Herger, J. Urology, 13: 343-354, March, 1925.**

"Bearing in mind the usefulness of radium, and of the high power x ray as most valuable adjuncts in the treatment of cancer of the prostate, we must still confess that a satisfactory method of dealing with this condition has yet to be described."

Consideration of the prostatic carcinoma is best handled by groups. In group one all definite carcinomatous enlargements palpable per rectum, with few urinary symptoms and without symptomatic or x ray evidence of metastases, are included. In this class x ray and radium are the therapeutic measures of choice. Under novocaine anesthesia, with the patient in the lithot-

omy position, guiding finger in the rectum, a trocar is introduced into the gland. Through it from 15 to 20 seeds of radium emanation, each containing 0.5 to 1 millicuries, penetrate the entire organ. Periprostic and pelvic treatment are given from without by means of the deep x ray from two or more portals of entry, each receiving from 90 to 100 per cent of an erythema dose placed into the diseased areas.

In group two all definite carcinomatous enlargements per rectum, with obstructive symptoms but without x ray or clinical evidence of metastases are placed. In this type local administration of radium seeds in the prostatic gland and deep x ray therapy in the pelvic structures precede relieving the local obstruction by a prostatectomy by the perineal route.

Group three consists of those individuals who have had a prostatectomy and are sent for post-operative radiation. Implantation of radium emanation seeds into the substance of the gland, followed by deep x ray therapy, is the method of choice.

In group four all those individuals are placed who have either been operated upon elsewhere or who have not, but all of whom have marked symptomatic disturbance with large residuals, often retention and definite evidence of metastases. This group is also treated with x ray and radium implantation and supplemented with periodic catheterization or suprapubic drainage.

### OSSEOUS SYSTEM

#### BACKACHE

**Some Roentgenological Aspects of Back Pain. Howard P. Doub, M. D., Therapeutic Gazette, 49:619-623, September, 1925.**

Because of the recent refinement of roentgen technique, one is now able to obtain satisfactory

films of any portion of the spine in practically any case.

Spondylolisthesis may be found in traumatic cases with symptoms persisting for a long time following a relatively slight injury.

Calcification of the iliolumbar ligaments is frequently seen in cases of lower back pain.

Arthritis is the most frequent of all findings in these cases and is manifested by typical bony changes. Malignancy should be searched for in cases past middle age which have persistent intense pain.

Anomalies are very frequent in the lumbosacral area, involving especially the fifth lumbar vertebra. In certain cases the symptom-complex can be directly attributed to these anomalies.

### HAND

#### **Infections of the Hand. R. A. Ross, F. R. C. S., South Africa M. Record, 23: 245-257, June, 1925.**

In the restoration of function in infections of the hand, Dr. Ross, Honorary Surgeon for the Transvaal Memorial Hospital for Children at Johannesburg, recommends the following physiotherapeutic measures. By the time healing has taken place, at about the end of two weeks, passive exercises are supplemented by:

1. Hydrotherapy may be applied in many different forms, but the hot paraffin bath he finds the most useful in finger stiffness following infection of the tendon sheath.

2. Electrotherapy is applied in the form of (a) radiant heat which causes temporary hyperemia, (b) galvanic current which promotes metabolism by stimulating muscle contraction and increasing vascular flow, (c) faradic current, the action of which on muscles through their nerves approaches the normal more nearly than any other method, and (d) ionization (chlorine and iodine in the treatment of scar tissue, and sodium salicylate in synovitis).

3. Massage is most effective if preceded by hydrotherapy or radiant heat, and which, of course, must be efficient, and is of special use after forearm infections.

4. Exercise, both active and passive, is used to restore contracted and wasted muscles. Vari-

ous devices can be used with the patient's co-operation, and, where finger stiffness is being treated, a game such as playing marbles or playing the piano or working a typewriter is of material benefit.

#### **Some Rarer Intracranial Calcifications and Ossifications. John O'Sullivan, M. D., Brit. J. Radiol., 30:295-304, August, 1925.**

Intracranial calcifications and ossifications are of comparatively common occurrence. Calcifications occur "physiologically" in such situations as the choroid plexus, the pacchionian bodies, the pineal and pituitary glands. Tumors, especially the psammomas, old tuberculous and syphilitic infiltrations, sclerotic arteries, aneurisms, old hemorrhages and cysts, are the more common pathological processes in which the calcification is found intracranially.

Ossifications in the intracranial structures themselves occur more frequently in the dura than in any other tissue. In the falx cerebri and usually in its anterior portion, these ossifications take the form of needles, plates, or buttons which are at times paired in its two layers. These are the so-called osteomas of the falx. In the tentorium cerebelli, especially in the region of its attachment to the dorsum sellae and the crest of the petrous portion of the temporal bone, and also in that strip of dura which forms the periosteum of the clivus, ossifications are found.

For his consideration of the rarer intracranial calcifications and ossifications, the writer presents a classification. In one group, the symmetrical retrobregmatic ossifications of the dura are considered; in another calcified cysticercus are included; in a third calculi in the brain are described; and in the fourth group calcified tumors are discussed.

## STATUS OF PHYSICAL THERAPEUTICS

### Facts and Fallacies of Physical Therapy.

**Morris Fishbein, M. D., Am. J. Electroth., 43:407-411, November, 1925.**

In this article Dr. Morris Fishbein, Editor of the A. M. A., presents the facts and fallacies of physical therapy as he sees them. Statements made in his discussion on the basis of physical therapy deserve repetition and serious consideration by every conscientious reader.

"We have in physical therapy various methods of producing heat in the human body. There is the heat produced by friction; the heat produced by the external application of light, of hot water or of other heat producing methods; and the heat produced within the body by diathermy, by the direct injection of heating material, or by the use of methods that will draw unusual quantities of blood to a certain point. In the evaluation of any form of physical therapy, who shall say to what extent the thermic factor alone is responsible and how far the other factors (physical changes within the tissues, mechanical changes within the tissues, power of suggestion, etc.) have a part to play?

"The numerous devices for effecting the production of heat, external or internal, for the body unquestionably vary in their potency and in their mechanism. How is the individual physician, who knows little or nothing of the physical basis of electricity and, in fact, who knows little or nothing of any physics at all, except in the use of the term as it applies to castor oil and cascara, to have any actual knowledge of these so-called modalities. If the situation that confronted the American Medical Association before the establishment of the Council of Pharmacy and Chemistry was confusion, that of physical therapy resembles almost chaos. Drug products were compounds of chemical substances which might easily be separated into their individual ingredients would or would not do what was claimed for them. But when one is con-

fronted with a large box beautifully trimmed with nickelplate and glass, the interior of which is a mass of wiring, spools, coils, gauges, screws, nuts and whatnot, and is told that, properly applied, this apparatus will cure pneumonia, neuritis, lumbago, eczema, dysmenorrhea, falling of the uterus and falling of the palate, who is to tell one whether or not the machine will actually do all that is claimed for it? When the textbooks in the field of physical therapy tell the physician that the spine of the patient with locomotor ataxia may be restored to its pristine glory by running a few shocks up and down from the cervical region to the coccyx, is he to discard the prognosis that he has made in the past and to tell the friends and relatives of the victim of the wiles of Venus that his lapse from virtue is to have no further evil effects? What is the physician to do when he learns that most of the textbooks in this field are the products of men who are employed by concerns selling apparatus; when he is constantly besieged with lecture courses paid for by those who have something to sell; when his office is inundated with literature telling him that his financial future depends on the purchase of a vast amount of such machinery? Clearly, a house cleaning is badly needed in this particular field.

"At the last annual session of the American Medical Association, held in Atlantic City, the House of Delegates, on the request of numerous members of the profession, voted the establishment of a Council on Physical Therapy, consisting of chemists, physicists, physiologists, pathologists and clinicians, who are to evaluate the actual worth of physiotherapeutic apparatus and methods, and to keep the medical public informed by regular statements of the actual truth or fallacy of such claims. . . . . A tentative list of membership for such a council was drawn up. It includes men who are leaders in the field of scientific medicine and in the specialties that have been mentioned, and representatives of the



greatest universities and institutions for research in physics and physical therapy that exist in this country. Practically all of these men have volunteered to serve without a cent of compensation, in order to give the medical profession unbiased and scientific statements concerning the physical therapy field. Their labors, as have been intimated, will be like the attempts of Hercules to clean the augean stables. And the medical profession may confidently look forward to the time when the path between the vast accumulation of discarded refuse, jumbled wires, rusted hydrotherapeutic apparatus, peculiar tables and benches, wornout electric bulbs, and other queer therapeutic apparatus, and the path leading by simple and clean methods to honest therapy will be clear."

#### LABORATORY INSTRUCTION

**Laboratory Methods in the Teaching of Physical Therapeutics.** W. H. MacCraken, M. D., *Am. J. Electroth.*, 43: 404-407, November, 1925.

Dean of the Detroit College of Medicine and Surgery, Dr. MacCraken speaks with authority. "My desire is to see each and every student in our medical schools become before graduation a highly skilled therapist with as broad and thorough a comprehension of the subject as his ability will allow."

The most important function of the medical school of today is to produce the best type of the practitioner of general medicine. Such a man attacks and strives to conquer the problems of health and disease as he meets them, and to do this well he must have at his command an extensive and varied armament. Up to the present time he has admittedly been considerably drug bound, but his therapeutic resources are now being rapidly expanded, especially in the physical field, so that in the very near future the administration of a dose of actinic energy will be as much of a commonplace in his ex-

perience as is the giving of a cubic centimeter of tincture of digitalis today.

Physiology is the basis for all rational therapeutics. And physiology is probably the most difficult of the medical laboratory sciences; yet unless a student be a good physiologist he cannot hope to become an intelligent and skillful therapist, this division of medical sciences into scholastic compartments, separated by impermeable academic partitions, is fundamentally wrong, and the first beginnings of physiotherapeutic instruction may very well be made in the department of physiology under the direction of that division of the teaching staff, using the students themselves as experimental material and demonstrating by means of physiological apparatus the effects on blood pressure, pulse rate, respiration, etc., which would be induced by changes of posture, active and passive exercise, and manipulation.

The place for this preliminary foundation is in the physiology laboratory. Effects of the voltaic and faradic currents may be observed, discussed and elaborately demonstrated in the laboratory of physiology. A portion of the "frog work," if necessary, may be converted into work capable of therapeutic interpretation. It would be desirable that a certain number of simple experiments involving the use of galvanic and faradic currents, with members of the class as subjects, be devised with a view to a more practical appeal to the mind of the student. And in all cases whenever possible the various whys and wherefores of each result must be sought. Naturally this will embody much work and preparation and many of the questions will remain unanswered; but the stimulus for scientific inquisitiveness will be established. Whenever possible the professors and instructors should anticipate these questions and aid the students to formulate clear, concise and scientific answers to the whys of the foregoing experiments. Again, the physiological laboratory is an appropriate place for the consideration of the effects produced by external thermal change. But as most

departments of physiology are now organized, little consideration is or can well be given to the study of high frequency currents, status electricity, or actinic waves, and their physiological manifestations. These departments must be revised.

Parallel with his work in pharmacology, the student should be given instructions in the physics of the various physiotherapeutic appliances available, supplemented by experiments calculated to show the effect of the forms of energy delivered on electrolytes, organic tissues and living organisms, always with the special emphasis on the word "why."

At this time, while in the study of actinic waves, both their bactericidal and physiological actions are to be considered. In this connection the resources of biochemistry are to be drawn upon.

"It may be doubted if any undergraduate medical school has on its teaching staff a man really qualified to properly instruct students in the various phases of physical therapeutics. These teachers must and will be developed, since the need for them has become recognized."

When the student comes in active contact with patients in the third a ground-work will be established, unbiased and founded upon scientific observation. When he makes his diagnoses under the supervision and with the aid of his clinical instructors; when he determines the particular form of physiological unbalance that characterizes his patient; when he is confronted with the question of therapeutics; *then* will have an opportunity to review his previous observations and decide upon the therapy indicated.

"It is fair to assume that, by the time the medical student enters his fourth year, he will be able to recognize with reasonable sureness the indications for the use of the various forms of physical therapeutics. If he be a student of the better type, he has acquired considerable discrimination and judgment and is qualified and

should be encouraged to use his physiotherapeutic experience, not only for the relief of the suffering, but along experimental lines with the view to adding his part to the knowledge already accumulated; and in his year of interne service his physiotherapeutic training will have become an essential part of his medical self, greatly enhancing his possibilities of public service and without which his field of usefulness would be sadly diminished."

#### DEPARTMENTAL INSTRUCTION

**The Physiotherapy Department and the Hospital. A. B. Hirsh, M. D., Am. J. Electroth., 43:399-404, November, 1925.**

Physiotherapy under medical graduates fully trained in this specialty associated with very few hospitals before the world war. Practically the only service answering these requirements was one organized by Dr. Frank B. Granger at the Boston City Hospital. Since the World War, however, physiotherapy has become more widely recognized; in some of our teaching institutions it has been received as a part of the didactic work. Columbia, Stanford, Rush, Pennsylvania and a few other medical schools include more or less physiotherapy in their curricula for undergraduates. Efficient graduate instruction on the subject, however, has heretofore been given at Harvard and in the offices of a few specialists in private practice.

A physiotherapy clinic should be handled on the same plan as any of the other medical clinics. It has an equal status with those of surgery, internal medicine, ophthalmology, or the other special services, and its medical director ranks accordingly. Because of the training he alone prescribes the patient's physiotherapy and is responsible for its administration. In small institutions with small staffs dealing with circumscribed class of cases, especially those of traumatic character, the suggesting of physiotherapy

by all members of the staff may give them a better working knowledge of its possibilities and tend to closer cooperation in treatment, but all physiotherapy orders should be subject to review by the physiotherapist. Under no circumstances should physiotherapy be prescribed by other physicians. It would be dangerous for a physician to direct a surgical operation or prescribe the technique for the ophthalmologist to follow. Similarly only a physiotherapist should prescribe physiotherapy.

Properly used, physical therapy will always serve as an adjunct to recognized medical and surgical procedures, and almost never to their exclusion. It deserves to be classed as a part of medical science and art.

### THERAPY

**Ultra Violet Therapy.** C. E. Piersall, M. D., *Am. J. Physical Therapy*, 2:301-303, October, 1925.

When one speaks of ultra violet light, sunshine is usually thought of. A comparison of the spectrum derived from sunlight, as it reaches the earth, to that which issues from a quartz burner has been presented by the author.

	Infra-Red	Visible Light	Ultra Violet Light
Sunlight .....	80	13	7
Mercury Vapor Lamp. .50 (average)		21	28

Owing to the laws of absorption influencing ultra violet transmission through media, the wave lengths which reach us from the sun end in the region of 2,967 angstrom units, whereas those from the mercury quartz lamp go as low as 1,850 angstrom units.

Two main subdivisions of these chemical rays are considered in their daily practical use; namely near ultra violet or biologic rays, which range from approximately 3,000 to 4,000 angstrom units; and far ultra violet or bactericidal rays, which range from 2,000 to 3,000 angstrom units.

Control of these rays is accomplished by distance of the lamp from the part exposed and by filters and time of exposure. A table is given demonstrating the lethal dose of ultra violet light to various bacteria:

Bacteria	Seconds of Exposure
Diplococci—	
Gonococci .....	6
Meningococci .....	6
Straphylococci—	
Pyogenes Albus .....	10
Pyogenes Aureus .....	12
Streptococci—	
Viridens .....	14
Hemplyticus .....	18
Mucosus .....	25
Pneumococci—	
Group I .....	25
Group II .....	20
Group III .....	25
Group IV .....	15
Bacilli—	
Influenza .....	18
Diphtheria .....	10
Tubercle .....	12
Leptrae .....	15
Colon .....	18
Typhoid .....	18
Dysentery Types .....	20

The bacterial action of the actinic rays is enhanced by photosensitive dyes, such as gentian violet, acriflavine, brilliant green or crystal violet in 1:1,000 parts of distilled water.

**Why We Use Static Current.** William Benton Snow, M. D., *Am. J. Electroth.*, 43:412-421, November, 1925.

The peculiar effects of the static current are derived from the fact that it is a direct or constant current of high potential and therefore possesses the characteristic qualities of the constant current in inducing direct muscular contraction of the muscle cells.

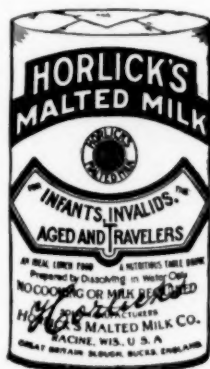
The effect of the static current important in therapeutics as outlined by the writer are:

1. The mechanical removal of infiltration from engorged tissues where no infection is present.

2. It produces a complete relief of tense muscles when applied, thereby overcoming muscular contraction associated with the inflammatory processes.

3. With the general administration of the one pole modality, it has a remarkable effect in improving local and general metabolism.

There is no other electrical current at present available possessing the same characteristics and capable of the same therapeutic effects as the static modalities and, from the fact that it is so remarkable in its influence upon inflammatory conditions, it is indispensable for prompt and complete relief of those conditions.



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